

ajer

**THE ALBERTA JOURNAL OF
EDUCATIONAL RESEARCH**

VOLUME XXIV NUMBER 3 SEPTEMBER 1978

**PUBLISHED BY
THE UNIVERSITY OF ALBERTA ● EDMONTON**

THE ALBERTA JOURNAL OF EDUCATIONAL RESEARCH

A quarterly journal devoted to the dissemination, criticism, interpretation and encouragement of all forms of systematic enquiry into education and fields related to or associated with education.

.....

Published quarterly in March, June, September and December
by the
Faculty of Education
of
The University of Alberta

.....

Faculty Publications Committee

<i>M. A. Assheton-Smith</i>	<i>W. T. Fagan</i>	<i>R. G. Martin</i>
<i>N. C. Bhattacharya</i>	<i>H. W. Hodysh</i>	<i>E. Miklos</i>
<i>J. Chambers</i>	<i>W. W. Laing</i>	<i>C. H. Preitz</i>

Editorial policy and the discussion and disposition of manuscripts are the joint responsibility of the Publications Committee. The views expressed and the accuracy of the statements made are the responsibility of the individual authors. The editor is solely responsible for the editorial comments.

Chairman: *E. Miklos*

Editor: *Henry W. Hodysh*

Secretary: *Mrs. A. Onishenko*

.....

AJER gratefully acknowledges support from Canada Council and AACES. AJER is indexed in the *Canadian Education Index*; appropriate articles are abstracted in *Educational Administration Abstracts*, *Psychological Abstracts*, and *Sociology of Education Abstracts*.

The subscription rate is \$8.00 per year; single copies are \$2.50 each. Please make cheques payable to *The Alberta Journal of Educational Research*. All back issues are available in bound and unbound volumes; rates supplied on request. Claims for undelivered copies must be received within three months of the month of publication.

Address all communications to the Editor, *The Alberta Journal of Educational Research*, Faculty of Education, The University of Alberta, Edmonton, Alberta, Canada T6G 2G5.

SECOND CLASS MAIL REGISTRATION NUMBER 1436



The Alberta Journal of Educational Research

Volume XXIV, Number 3

September, 1978

CONTENTS

Post-Secondary Aspirations of High School Seniors in Different School Contexts: A Canadian Study	137
<i>G. P. O'Neill</i>	
The Effect of TV Viewing on the Educational Performance of Elementary School Children	156
<i>C. C. Anderson and T. O. Maguire</i>	
Attitudes Toward Mathematics and Mathematics Instruction of Prospective Elementary Teachers	164
<i>J. H. Vance</i>	
School District Size and the Deployment of Personnel Resources	173
<i>R. L. Daft and S. W. Becker</i>	
Iconic and Immediate Memory in Elementary School Children	188
<i>G. D. Ewert and H. L. Janzen</i>	
Measurement of Community School Development	204
<i>K. C. Sullivan</i>	

BOOK REVIEWS

<i>Research in Education (Third Edition)</i> , John W. Best	213
Reviewed by V. R. Nyberg	
<i>Canadian Education: A Sociological Analysis</i> , W. B. W. Martin and A. J. Macdonell	215
Reviewed by Helen L. Pierce	
<i>Why Be A Headmaster?</i> , J. R. Sutcliffe	216
Reviewed by E. L. Edmonds	
<i>Beleving en Ervaring (Experience and Lived Experience): Werkboek Fenomenologie voor de Sociale Wetenschappen</i> , T. Beekman and K. Mulderij	217
Reviewed by Max van Manen	

FACULTY OF EDUCATION
The University of Alberta

Announcement
of the
CENTRE FOR THE STUDY
OF POSTSECONDARY
EDUCATION

A new facilitating structure for adult and higher education has been established by the Faculty of Education of the University of Alberta. The newly appointed coordinator, Dr. A. G. Konrad now administers the graduate diploma in postsecondary education and will coordinate the development of new programs, research and service activities within the faculty as they relate to postsecondary education.

The Centre will place an emphasis on the importance of service activities other than formal programs of instruction. There is a recognized need for training of practitioners who are technically competent but who have experienced little or no exposure to instructional procedures. The Centre plans to provide staff development projects in colleges and other institutions; consult with business and industry on training needs; help design programs for adult skill development in various community settings and participate in, as well as plan, conferences and workshops. A series of spring workshops for adult educators was enthusiastically received.

The Centre also plans to intensify systematic research activity into adult education needs. The Centre will facilitate the coordination of and communication between faculty members engaged in individual or collaborative research projects and will provide a resource base for visiting scholars and other researchers.

For additional information about the activities of the Centre please write:

Dr. A. G. Konrad, Coordinator
Postsecondary Education Centre
7-133G Education North
University of Alberta
Edmonton, Alberta
T6G 2G5

G. P. O'NEILL

Brock University

Post-Secondary Aspirations of High School Seniors in Different School Contexts: A Canadian Study

Using questionnaire data from grade twelve students in the Regional Municipality of Durham (Durham Region), Ontario, Canada, this study examines school contextual effects on levels of post-secondary aspirations. A linear regression model sorts out simultaneous effects of the independent variable, school environment, on the dependent variables, levels of educational and occupational aspiration, with relevant control factors held constant. Results show that, even though school environmental effects are trivial and unreliable, the variables parental expectations, family socioeconomic status, and school peer group do make substantial contributions to the variance in both dependent variables. (Dr. O'Neill is Assistant Professor of Education in the College of Education at Brock University.)

Within the past twenty years, sociologists and educators have started to look more closely at both the distinctive traits of collectivities and the consequences that membership in particular groups can have on attitudes and behaviours of their respective members. Much of this work has been devoted to identifying and isolating the "contextual effects" that account for variability in post-secondary aspirations of similar individuals in distinctively different groups. The contextual effect itself concerns the socialization of an individual with a specific environmental setting or milieu.

The importance of such research has generally been related to the fact that pupil populations of a region, or school, can be a useful resource in the accomplishment of certain educational objectives. For example, Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, and York (1966) suggested that there were optimal patterns of student allocation, in some districts, which could materially assist in the attainment of particular goals (i.e., through busing students to affect an integration of certain racial, ethnic, and socioeconomic groups). Hence, the magnitude of contextual effects, and specifically their magnitude when compared with that of other more easily manipulative variables, should be of considerable interest to researchers and practitioners of social and educational theory.

In this study, an attempt is made to examine differential levels of educational and occupational aspirations among youth in different school contexts in the Regional Municipality of Durham (Durham Region), Ontario, Canada. More precisely, the focus of this investigation is towards a contextual explanation of variability in high school seniors' post-secondary educational and occupational aspirations. This explanation is presented by way of construction and quantification of a linear regression model which incorporates influences due to certain personal and social psychological variables and the social-structural variable school context.

Background to the Study

Although school contextual effects may empirically conform to a variety of patterns, they have generally been interpreted in terms of reference group theory. According to this interpretative paradigm (Kelly, 1968; Kemper, 1968), a person adjusts his behaviour and beliefs to the current modes and codes that seem to be most salient within his membership group(s). The major operational assumption of this theoretical interpretation is that specific individuals or collectivities, commonly referred to as significant others, are of such internal importance that the subject tries to meet the expectations which are thought to be especially needed in order to be socially acceptable. As Kemper (1968) states,

Achievement is powerfully related to the types of reference groups available to an individual, and that lacking these groups, his achievement striving will be seriously hampered. (p. 31)

Kemper (1968) continues,

In general, a reference group is a group, collectivity, or person which the actor takes into account in some manner in the course of selecting a behavior from among a set of alternatives, or in making a judgment about a problematic issue. A reference group helps to orient the actor in a certain course, whether of action or attitude. (p. 32)

Thus, the interpretative paradigm assumes that an individual or a mass of individuals (role exemplar[s]) with certain values and/or goals must be present within a given context (in this case, school environment) if interpersonal influences are to operate effectively. This critical normative mass should, in fact, provide the circumstances under which certain types of actions are deemed worthy of emulation.

In terms of aspirations, then, particular sets of collective orientations may promote or inhibit individual student's interest and engagement in future academic endeavours, and in this way serve as resources in the educational and occupational decision making process (i.e., whether to undertake post-secondary education, and at what level). In other words, school contextual effects on levels of aspiration are assumed to depend upon the responses of individual students to the presence or absence of predominant trends in the plans of "generalized others" in the high school.

To date, several studies (Boyle, 1966; Coleman et al., 1966; Hauser, 1969; McDill & Coleman, 1965; McDill, Meyers, Jr., & Rigsby, 1967; Michael, 1961; Myer, 1970; Nelson, 1972; Turner, 1964; Wilson, 1959) have attempted, in various ways, to test this paradigm in different school settings. From a review of the literature, two facts emerge rather clearly. First, there is little

consensus among the researchers. On the one hand, studies by Boyle (1966), Coleman et al. (1966), McDill and Coleman (1965), Michael (1961), Turner (1964), and Wilson (1959) maintain that school effects, albeit small in some instances, are important factors in determining differential levels of achievement or aspiration. On the other hand, studies by Hauser (1969), McDill et al. (1967), Myer (1970), and Nelson (1972) claim that the magnitude of school environmental effects are negligible factors in determining students' overall levels of achievement or aspiration.

Secondly, there has generally been a lack of Canadian contextual studies. Indeed, of all the works cited, only one (Boyle, 1966) used Canadian subjects. The need for more comparative Canadian research has been continually stressed over the years by concerned social scientists. As far back as 1957, for example, Fleming, in having to base his conceptualization extensively on American studies, regretted this state of affairs and implied the need for systematic local research. He subsequently participated in one of the pioneering Ontario efforts on the subject of post-secondary education (Atkinson Study of Utilization of Student Resources, 1957) which helped unravel some of the specific processes impinging on educational aspirations among Ontario students. Still, eight years passed, and matters did not drastically change. As Fleming (1965) protested,

It must also be kept in mind that most of the thousands of studies reported have been carried out in the United States. It is characteristic of this type of study that local factors play an important part. . . . It is hard to discover a creditable reason why investigation in Canada should have lagged behind. (pp. 8-9)

More recently, Pike (1970) reiterated the Canadian case by stating that, "Unlike the United States, Canada has not been anxious to turn the light of empirical social research on educational problems and processes" (p. 10).

In summary, then, there is need for more local Canadian contextual studies because: (1) generalizations are hampered by disagreement in the literature, and (2) there has generally been a lack of Canadian contextual research.

Development of the Model

General Design

The problem of isolating social-structural effects from individual effects is of crucial concern in contextual research. Spurious environmental effects, known as statistical artifacts, can result unless the following two factors are considered. First, there is the problem of intercorrelations among the individual control variables and the contextual independent variable (school environment). Such intercorrelations are referred to as multicollinearity (Gordon, 1968, p. 596). Stated in interrogative terms, the problem becomes: Is school environment independently associated with both educational and occupational aspirations, or are the zero-order associations an artifact of the common relationship of aspirations and school environment to one or more of the individual control factors?

Secondly, there is the problem of contaminative effects due to the uneven distribution of certain individual attributes within different structural units of the contextual independent variable. For example, intelligence (mental

ability) has been shown to be differentially related to levels of aspiration. That is, more students with high mental ability ratings aspire to a university education than do those with low mental ability ratings (Berdie, 1953; Breton, 1972; Bordua, 1960; Kahl, 1953; Pavalko, 1967; Sewell, Haller, & Straus, 1957). If mental ability ratings within each of the different structural units are unevenly distributed, then mental ability ratings could be either an advantage or a disadvantage for a particular school. Stated in question format, the problem becomes: Do subjects in school environment A have fewer university aspirations than subjects in school environment B because of contextual effects within their respective high schools, or is the uneven distribution of intelligence within structural units the main factor?

The first problem can be solved by employing a technique which will sort out the unique variance accounted for in the dependent variables by school environment. This can only be accomplished by holding all relevant individual control variables constant simultaneously. Similarly, the second problem necessitates the use of multiple controls. All categories of the control factors known to be differentially related to aspirations, while at the same time suspected to be unevenly distributed within units of the independent variable, must be equalized or matched within all units of independent variable.

According to Tannenbaum and Bachman (1964), multiple regression is one statistical procedure which can greatly minimize spurious effects in contextual studies. It will not only sort out collinearity effects among the independent and control variables, but it will also eliminate contamination effects within categories of the independent variable. In multiple regression, the analysis becomes the evaluation and measurement of overall dependence of a criterion variable on a set of other variables. The multivariate procedure used in this study is part of the Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975).

Identifying the Control Variables

In addition to intelligence, four other variables are known to be differentially related to levels of aspiration: family socioeconomic status, sex, parental expectations, and school peer group. Evidence indicates that family socioeconomic status, however measured, is clearly related to differential levels of aspiration. In short, students from middle class socioeconomic households are considerably more likely to plan on university and seek high status jobs than those from working class socioeconomic households (Anisef, 1973; Breton, 1972; Clark, Cook, Fallis & Kent, 1975; Kahl, 1953; Marsden & Harvey, 1971; Pavalko & Bishop, 1966a; Porter, Porter & Blishen, 1973; Sewell et al., 1957; Sewell & Shah, 1968b; Wilson & Buck, 1960).

Furthermore, male students are, on the average, much more likely to have higher educational and occupational aspirations than female students (Anisef, 1973; Fleming, 1957; Haller & Sewell, 1957; Karmel, 1975; Marsden & Harvey, 1971; Pavalko & Bishop, 1966a; Porter et al., 1973; Sewell, 1964).

Also, some social scientists have contested that family socioeconomic status is at best a crude indicator of the home's influence on post-secondary aspirations of high school seniors. More explicitly, while it is recognized that socioeconomic class is strongly related to aspirations, it is believed that

parental encouragement (expectations) for higher education and occupation can be an overriding class factor. In fact, a number of works dealing with the importance of the family as a socializing agency have taken the stance that, even though many working class families are relatively disadvantaged, they nonetheless raise their children according to the pattern more commonly associated with the middle class ideal (Boocock, 1966; Bordua, 1960; Cohen, 1965; Sewell & Shah, 1968a, 1968b; Rehberg & Westby, 1967).

Berdie (1954), Breton (1972), and Elder (1965) carry this theme one step further. They maintain that family influences on adolescents' attitudes towards university and the professions provide a greater impetus for university attendance than the general economic facilities of the family. Evidence from studies by Kahl (1953) and Simpson (1962) tend to support this claim.

Kahl studied a sample of twenty-four working class boys from public high schools in Metropolitan Boston, and found that the crucial differences between the twelve who aspired to go to university and the twelve who did not was the amount of parental pressure for university attendance among the former group. Parental pressure was almost nonexistent among the boys who lacked higher educational aspirations. Likewise, Simpson, in a southern United States study of occupational aspirations of high school seniors, found that for both middle and lower class boys, parental influence was more strongly related to aspirations than socioeconomic class. Simpson (1962) states,

... parental advice is a much better indicator of high ambition than is the boy's social class. Only 21.0 per cent of the unambitious middle-class boys and 16.0 per cent of the nonmobile working-class boys had been advised by one or both parents to enter professions; this compares with 53.1 per cent among the ambitious middle-class boys and 43.5 per cent among the mobile working-class boys (p. 519).

It would seem, therefore, that parental expectations are more accurate barometers of family influence than is the socioeconomic class of the family. Indeed, parental encouragement can become a vehicle through which the parents translate their achievement and mobility values into a role expectation comprehensible to the adolescent—that he or she is to continue his or her education beyond high school.

Thus, to type students solely on the basis of their socioeconomic class, as some contextual studies have done, may provide an extremely inaccurate picture of the home environment. At the same time, however, the inclusion of the variable, parental expectations, should not exclude the variable, family socioeconomic status. With parental expectations controlled, family socioeconomic status merely becomes a more precise measure of one feature of the home milieu relating to education, namely, the type of role model that the parents present for the child to emulate.

Finally, the variable, school peer group, was included in the model as an alternative mechanism for linking the social-structural unit to the individual. The variable has been shown to be highly correlated with both levels of achievement and aspiration (Alexander & Campbell, 1964; Bain & Anderson, 1974; Beilin, 1956; Duncan, Haller & Portes, 1968; Haller & Butterworth, 1960; Herriott, 1963; Pavalko & Bishop, 1966b). More precisely, the more post-secondary bound peers a student perceives as having (specific others), the more likely that student will want to pursue a post-secondary education.

Hence, it was speculated that school peer group might have unique and statistically significant effects on aspirations separate from those of the other control variables and the independent variable school environment.

This study remains unparalleled, then, in that it examines the school social structural question from two perspectives: generalized others and specific others. That is, social interaction effects on aspirational levels are not only measured and assessed indirectly through the dominant socioeconomic composition of the high school population (contextual effects), but directly through the control variable school peer group (sociometric effects).

Quantification of the Model

The regression model includes five control variables, one independent variable, and two dependent variables. The operational definition of each variable is presented along with a brief description of how it was measured. The five control factors are: mental ability (intelligence), family socioeconomic status, sex, parental expectations, and school peer group.

Mental ability. The variable intelligence was based on scores from the Culture Fair Intelligence Test (Cattell & Cattell, 1960a, 1960b). High, medium, and low mental ability ratings were obtained by dividing all raw scores into near equal thirds.

Family socioeconomic status. Students were divided into low, middle, and upper socioeconomic status levels according to their father's occupational rating(s) on Blishen's Socioeconomic Index for Occupations in Canada (Blishen, 1971). Three socioeconomic classes were arrived at by combining seventy, sixty, and fifty ratings into high socioeconomic status (upper class), forty ratings into medium socioeconomic status (middle class), and thirty and twenty ratings into low socioeconomic status (working class).

Sex. For computer purposes, males were assigned a one and females were given a two.

Parental expectations. Students were asked to respond to questions which recorded their perceptions of their parents' attitude toward their future plans. The variable was trichotomized into low, medium, and high encouragement categories. The low category signifies no or little post-secondary expectation, the middle category indicates diploma granting colleges, and the high category includes degree granting universities.

School peer group. The variable was dichotomized into positive and negative socializing effects. Students who indicated that "most to all" of their friends were planning on a post-secondary education were considered to have a positive peer group impetus. Contrariwise, students with "few to no" post-secondary oriented friends were classified as having a negative peer group impetus.

The contextual independent variable, school environment, was based upon the dominant socioeconomic composition of the high school student body. Schools with predominately middle and upper class clientele were classified as having middle class milieus. Schools composed of mainly working class students were considered to have working class environments. This information was first obtained from the principals and later verified by tabular analysis.

The two dependent variables in the study are educational and occupational aspirations. The former variable refers to students' post-secondary educational plans while the latter variable refers to students' vocational or occupational ambitions after school.

The concept, level of aspiration (Haller & Miller, 1971; Haller, Otto, Meier & Ohlendorf, 1974), includes an orientation towards a goal. The person's goal is a selection of one among the alternative behaviour levels that are possible with respect to an objective. The alternative behaviour levels must vary in the degree to which they are difficult to achieve. That is, the alternatives must be ranked in a continuum of difficulty. The person's choice is fluctuant in that its central tendency may lie at any point or limited range of points along the continuum of difficulty. The central tendency of the person's orientation is that point or limited range of points which has the highest valence for that individual. This is the person's level of aspiration. The term differential level of aspiration logically implies variation in the point of valence when it is estimated at different times on the same person, or at same or different times on different persons. In this study, the term is restricted to variations among different persons at the same time.

The concept "level of occupational aspiration" (LOA) is a special instance of the more general term. It differs from the general concept only in that it takes as its object the occupational hierarchy, and the continuum of difficulty consists of the various levels along the hierarchy. Level of occupational aspiration was measured by Haller and Miller's (1971) Occupational Aspiration Scale (OAS). The range of possible scores on the OAS is from zero to seventy-two. Low, medium, and high levels of occupational aspiration were obtained by dividing all raw scores into approximate thirds.

The concept "level of educational aspiration" (LEA) is likewise a special case of the more general concept. It differs from the general concept only in that it takes as its object the post-secondary educational hierarchy, and the continuum of difficulty comprises the various levels along the hierarchy. The hierarchy contained nine alternatives: trade school with an apprenticeship in the field, agricultural college, business school or college, institute of technology, military college, the Ontario College of Art, theological seminary, community college, and university.

A threefold classification system developed in which the definitely decided and partially decided were given precedence over the undecided. A university choice definitely or partially decided was given a high rating. An undecided university choice was given a medium rating. Selection of a diploma granting college was also given a medium rating if the student indicated either a definite or partial decision to attend. Low ratings were given to college undecideds, to those who had no post-secondary aspirations, and to those who planned to pursue a trade with an apprenticeship in the field.

A schematic representation of the complete regression model is illustrated in Figure 1. Possible intercorrelations between the five control factors are shown by arrowed lines. The bar line between the control variables and the independent variable, school environment, is intended to show that there is only one independent variable in the model, and that high schools, City W1, City M1, Town W2, and Town M2, are merely structural units of this variable.

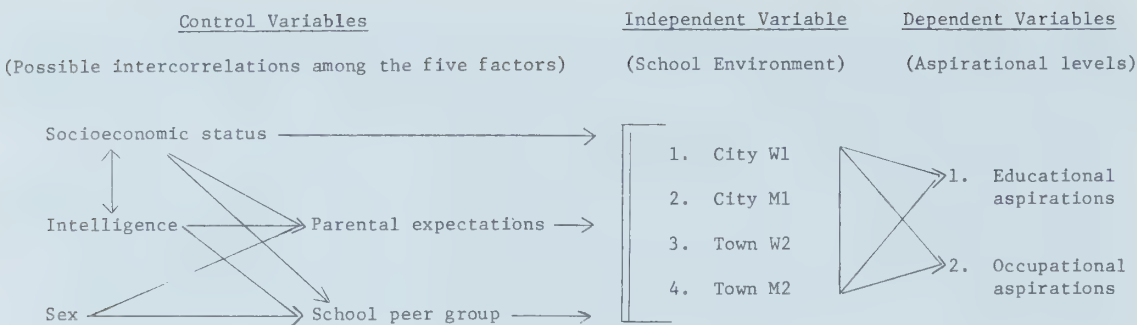


Figure 1. The complete regression model.

The letters W and M stand respectively for working class and middle class socioeconomic environments. Finally, the inverted pyramids capped with arrows between the four school units and aspirational levels indicate that there are two dependent variables in the model, namely, educational aspirations and occupational aspirations.

The Hypothesis

The model tests the premise that the bulk of students in a high school (indexed by the dominant socioeconomic composition of the student body) provides a significant normative influence on students' overall levels of aspiration when relevant control factors are simultaneously controlled. In general terms, the inquiry asks:

1. Does school environment have a significant influence on students' post-secondary aspirations?
2. Does the zero-order association persist when relevant control factors are simultaneously controlled?
3. How much variance does school environment account for over and above that accounted for by the control variables?

In response to the questions, the alternative hypothesis assumes the affirmative. That is, school environment will have a significant influence on students' post-secondary aspirations. More precisely,

Students will have, on the average, higher educational and occupational aspirations in middle class high school environments than in working class high school environments.

Methodology

Study Site

The study was conducted in high schools under the jurisdiction of the Durham Board of Education in the Regional Municipality of Durham (Durham Region), Ontario, Canada. Durham Region stretches from Lake Ontario in the south to the Talbot River (east shore of Lake Simcoe) in the north and from Northumberland and Victoria counties on the east to Metropolitan Toronto and York Region on the west.

The region itself can be divided into two geographic and economic zones: a highly industrialized, urbanized, southern corridor and a northern rural farming area. There are no ethnic enclaves in the region, although there has

been a small influx of new immigrants in the last ten years. Low rental housing is minimal, as are elite dormitories. The small-towns to the north and the larger cities to the south serve as drawing areas for shopping, recreational, and business activities.

The region and surrounding areas offer its citizens ample opportunities for post-secondary education. Within easy driving distance are three universities and three community colleges. Trent University is located to the east at Peterborough, while Scarborough College, University of Toronto, is located to the immediate southwest. Durham Community College is located within the Oshawa-Whitby corridor, while to the east again at Peterborough is situated Sir Sandford Fleming College with a branch campus at Lindsay. To the north, at Orillia, is Georgian Community College and the Wilfrid Laurier University extension program.

Data Collection

Four high schools were selected according to the following four criteria: (1) they had to have near equal enrollments, (2) they had to offer the three main streams or programs up to and including grade twelve (academic, vocational, and business and commerce), (3) the overall student body socioeconomic composition had to be predominately working class in one of the small-town and city high schools and predominately middle class in the other two high schools, and (4) all high schools had to be under the same administrative unit. This helped minimize resource differences in schools by placing some control over the distribution and utilization of various facilities within structures. In addition, it gave a degree of uniformity to such variables as student-teacher ratio, guidance and counselling aids, methods of evaluation and promotion, as well as to the operational goals underlying school curriculums.

The Occupational Aspiration Scale (OAS), the Culture Fair Intelligence Test, and the Survey Schedule (a self-made instrument) were administered to all grade twelve students within each of the four high schools in the late fall and early winter of the 1975-76 school year. In total, the researcher polled seven hundred and fifty students. This represented a return of approximately ninety per cent across the four clusters.

Data Analysis

Two types of analyses, using the Statistical Package for the Social Sciences (SPSS) (Nie et al., 1975), were performed on the data: tabular and multiple regression. Tabular analysis established zero-order relationships between each of the control factors and the independent variable and the two dependent variables respectively. Zero-order correlations, using chi-squares, confirmed or refuted statistically significant relationships, and control factor distribution within categories of the independent and dependent variables were ascertained by an examination of individual tables. In addition, Cramer's correlation coefficient (Blalock, 1972, p. 230) was employed to approximate the strength of each statistically significant association. One could then test for linearity, a prerequisite in the use of linear regression, and assess the rough magnitude of each control factor on the independent and dependent variables.

Although tabular analysis was useful in mapping out separate effects, there was need for a more precise estimation of the relative influence of each variable in terms of a standardized measure. Further, this measure had to be strictly comparable from one stage to another while taking into account the full range of available data. Multiple regression, in the form of one-way analysis of variance, with option nine (SPSS, ANOVA), met this requisite. In option nine, all effects, including main effects, covariate effects, and any interaction effects are assessed simultaneously as in straight multiple regression (SPSS, REGRESSION). Each effect is the additional contribution to the explained variation in the dependent variables after adjustment has been made for all other effects.

The values of the dependent variables were predicted from the linear function of the form,

$$Y' = A + B_1X_1 + B_2X_2 + \dots B_6X_6,$$

where Y' represents the estimated value of Y , A is the Y intercept, and B_i are partial regression coefficients. B_1 stands for the expected change in Y with a change of one unit in X_1 when X_2 to X_6 are held constant. Expressed in another way, B_1 is the expected difference in Y between two groups which are different on X_1 by one unit but are the same on X_2 to X_6 . Similarly, B_6 (the independent variable) stands for the expected change in Y with a unit change in X_6 when X_1 to X_5 are held constant (Gordon, 1968; Kerlinger, 1973).

The A and B_i coefficients were selected so that the sum of squared residuals $\sum (Y - Y')^2$ is minimized. This least squares criterion suggests that any other values of A and B_i would yield a larger $\sum (Y - Y')^2$. Further, selection of the optimum A and B_i coefficients using the least squares criterion intimates that the correlation between the actual Y values and the Y' estimated values is maximized, while the correlation between the independent variables (controls included) and the residual values ($Y - Y'$) is reduced to zero.

The overall null hypothesis, $H_0 : R = 0$, is equivalent to the null hypothesis that all k regression coefficients are equal to zero in the population. More precisely, $H_0 : B_1 = B_2 = \dots B_k = 0$. The alternative hypothesis, stated in terms of population regression coefficients, is $H_1 : B_i \neq 0$ for one or more i . (For a detailed discussion of multiple regression analysis, see Jae-On Kim and Frank J. Kohout in Nie et al., 1975, pp. 320-342.)

Results

A series of regression equations were employed to measure rough and refined effects of high school environment on both educational and occupational aspirations. The first equation assessed the gross magnitude of school effects on each dependent variable. The words "gross magnitude" are used because the individual factors were not controlled for either separately, successively, or simultaneously. Results are shown in Tables 1 and 2.

Although both F values in Table 1 are greater than one, neither is statistically significant. Thus, even with the control factors excluded, school environment does not have a statistically significant relationship with either dependent variable.

TABLE 1
ONE-WAY ANALYSIS OF VARIANCE WITH OPTION 9, OCCUPATIONAL
AND EDUCATIONAL ASPIRATIONS BY HIGH SCHOOL,
ALL COVARIATES EXCLUDED^a

	Sum of Squares	D/F	F Value	p*
<u>Occupational Aspirations</u>				
Environmental effects	3.737	3	1.88	.130
Residual	481.225	726		
Total	484.962	729		
<u>Educational Aspirations</u>				
Environmental effects	2.521	3	1.35	.258
Residual	453.567	726		
Total	456.088	729		

^a 750 cases were processed. 20 cases (2.7%) were missing.

* The statistical significance of the relationships examined throughout the analysis is determined by appropriate tests using the .05 probability level ($p \leq .05$).

TABLE 2
UNADJUSTED DEVIATIONS OF THE FOUR HIGH SCHOOLS AROUND
THE GRAND MEANS OF OCCUPATIONAL AND
EDUCATIONAL ASPIRATION

Occupational Aspirations	Unadjusted Deviations	Educational Aspirations	Unadjusted Deviations
1. City W1	-0.02 (3.) ^a	1. City W1	0.01 (2.)
2. City M1	0.03 (2.)	2. City M1	-0.04 (3.)
3. Town W2	-0.13 (4.)	3. Town W2	-0.07 (4.)
4. Town M2	0.08 (1.)	4. Town M2	0.09 (1.)
Grand Mean = 2.00		Grand Mean = 2.18	
Multiple R ² = .008		Multiple R ² = .005	
Multiple R = .088		Multiple R = .074	

^a In this and all successive tables, numbers in parentheses give the hierarchical order of each structural unit.

The nonsignificant contributions of each structural unit are given in Table 2. The unadjusted deviations are the means of each structural unit expressed as deviations around the grand means of occupational and educational aspiration. The middle class small-town high school (Town M2) ranks high on both dependent variables, while the working class small-town high school (Town W2) ranks low on both dependent variables. In contrast, the middle and working class city high schools (City M1 and City W1

respectively) each have a two and a three rating. At the same time, however, the spread between structural units is extremely small because school environment accounts for only 0.8 per cent ($.008 \times 100 = .80$) of the variance in occupational aspirations and 0.5 per cent ($.005 \times 100 = .50$) of the variance in educational aspirations.

In order to test the complete regression model, a second series of equations were generated to see: (1) which control variables were accounting for most of the variance in the dependent variables, (2) if the order of structural units around the grand means would remain constant, and (3) whether school environmental effects would partially remain or completely disappear.

Tables 3 and 4 summarize the results of occupational aspiration by school environment with the five covariates (control factors) simultaneously controlled. Table 3 reveals that, of the five covariates, three have statistically significant relationships with occupational aspirations. Included are parental expectations, family socioeconomic status, and school peer group. The other two control factors, sex and intelligence, are equally weak as neither has an *F* value greater than one. School environment itself has an *F* value greater than one, but its association with occupational aspirations is not statistically significant.

The unreliable contributions of each structural unit are displayed in Table 4. The unadjusted and adjusted deviations are the means of each structural unit expressed as deviations from the grand mean of occupational aspirations. The adjusted hierarchical order of the structural units in Table 4 is the same as that of the unadjusted order in Table 2.

The multiple *R* squared value of 0.266 (27 per cent) is the total amount of variance accounted for in the dependent variable by the additive effects of all the common and unique contributions of each covariate and the independent variable. The multiple *R* value (0.516) gives the strength of the multiple relationship between the dependent variable and the independent variable plus the five covariates. In this case, it is a moderately strong positive relationship.

Eta squared (η^2) is the proportion of variance in the dependent variable explained by both the unique contribution of school environment plus the common or shared contributions of school environment and the five covariates. More precisely, it includes both the overlap variance within the independent variable and the covariates plus the independent variable's unique contribution. Beta squared (B^2), on the other hand, is the exclusive contribution of school environment devoid of the covariate overlap. Accordingly then, school environment makes a $.008 \times 100 = 0.8$ per cent joint contribution to the variance in occupational aspirations. However, when adjustments are made for the five covariates, its unique contribution drops to 0.4 per cent ($.004 \times 100 = .40$).

Tables 5 and 6 present the results of educational aspiration by school environment with the five covariates simultaneously controlled. Once again, three of the covariates, parental expectations, family socioeconomic status, and school peer group, have statistically significant relationships with the dependent variable. Although sex has an *F* value greater than one, it is not statistically significant. Intelligence and high school environment are the weakest factors having *F* values of less than one.

TABLE 3
ONE-WAY ANALYSIS OF VARIANCE WITH OPTION 9, OCCUPATIONAL
ASPIRATION BY HIGH SCHOOL CONTROLLING SIMULTANEOUSLY
FOR THE FIVE COVARIATES^a

Independent Variables	Sum of Squares	D/F	<i>F</i> Value	<i>p</i>
Covariates	121.329	5	48.660	.001
Parental expectations	36.428	1	73.049	.001
Family socioeconomic status	14.005	1	28.083	.001
Intelligence	0.032	1	0.065	.999*
School peer group	16.068	1	32.220	.001
Sex	0.108	1	0.217	.999
High School Environment	1.784	3	1.193	.311
Residual	338.106	678		
Total	462.964	686		

^a 750 cases were processed. 63 cases (8.4%) were missing.

* If the *F* value is not greater than 1, SPSS does not compute the *p* value. Instead, it prints .999.

TABLE 4
UNADJUSTED AND ADJUSTED DEVIATIONS OF THE FOUR
HIGH SCHOOLS AROUND THE GRAND MEAN OF
OCCUPATIONAL ASPIRATIONS

Structural Units	Unadjusted Deviations	Adjusted for Covariate Deviations
1. City W1	-0.03 (3.)	-0.03 (3.)
2. City M1	0.03 (2.)	0.03 (2.)
3. Town W2	-0.12 (4.)	-0.09 (4.)
4. Town M2	0.08 (1.)	0.05 (1.)
Summary Measures	Multiple R ² = .266	
	Multiple R = .516	
	Eta ² = (0.09) ² = .008	
	Beta ² = (0.06) ² = .004	
	Grand Mean = 2.00	

The nonsignificant effects of each structural unit are illustrated in Table 6. The adjusted hierarchical order of the structural units in Table 6 is identical to the unadjusted order in Table 2. This time, school environment makes a 0.5 per cent joint contribution to the variance in educational aspirations, but its unique contribution drops to only 0.2 per cent when adjustments are made for the five covariates. Total amount of variance

TABLE 5
ONE-WAY ANALYSIS OF VARIANCE WITH OPTION 9, EDUCATIONAL
ASPIRATION BY HIGH SCHOOL CONTROLLING SIMULTANEOUSLY
FOR THE FIVE COVARIATES^a

Independent Variables	Sum of Squares	D/F	F Value	p
Covariates	157.364	5	78.631	.001
Parental expectations	83.028	1	207.437	.001
Family socioeconomic status	3.040	1	7.595	.006
Intelligence	0.369	1	0.923	.999
School peer group	9.435	1	23.571	.001
Sex	0.794	1	1.984	.156
High School Environment	0.653	3	0.544	.999
Residual	271.374	678		
Total	431.005	686		

^a 750 cases were processed. 63 cases (8.4%) were missing.

TABLE 6
UNADJUSTED AND ADJUSTED DEVIATIONS OF THE FOUR
HIGH SCHOOLS AROUND THE GRAND MEAN OF
EDUCATIONAL ASPIRATIONS

Structural Units	Unadjusted Deviations	Adjusted for Covariate Deviations
1. City W1	0.03 (2.)	0.01 (2.)
2. City M1	-0.04 (3.)	-0.02 (3.)
3. Town W2	-0.08 (4.)	-0.04 (4.)
4. Town M2	0.07 (1.)	0.05 (1.)
Summary Measures	Multiple R ² = .367	
	Multiple R = .605	
	Eta ² = (0.07) ² = .005	
	Beta ² = (0.04) ² = .002	
	Grand Mean = 2.17	

accounted for is quite substantial (37 per cent). The multiple *R* of .605 suggests a strong positive multiple relationship between the dependent variable and the independent variable and the five covariates.

Discussion

The findings of this Canadian study are congruent with past American research which found that school contextual effects are extremely minimal. Students in the two middle class high school environments do not have, on

the average, higher levels of aspiration than students in the two working class high school environments. School environment, as reflected in the dominant socioeconomic composition of a high school, does not account for much of the variance in either educational or occupational post-secondary aspirations. Indeed, even with the control factors excluded, school environment never contributed to more than one per cent of the variance in either dependent variable. Thus, it can be concluded that, in this study, school environmental effects are not only statistically meaningless, but substantively weak.

This conclusion implies, then, that the administrative strategy of attempting to balance the socioeconomic compositions of a region's high schools, at least in order to influence aspirations, may not be particularly effective. In fact, these findings suggest that no effect at all may result when balancing is done across schools. Yet, this is decidedly not to say that such balancing should not be attempted since there may be factors which should be considered other than the one of aspirations. For example, self- and school-related attitudes may be more susceptible to administrative manipulation of school contexts. Of course, this is mere speculation as there is no evidence from this study to support such a claim.

Despite the small contributions of school environment, overall the regression model does have good explanatory powers. The range of total variance accounted for varies from a low of 27 per cent to a high of 37 per cent. This definitely indicates, therefore, that the model contains many pertinent personal and social psychological variables.

Three control factors, in particular, accounted for most of the variance: parental expectations, family socioeconomic status, and school peer group. All three variables had statistically significant associations with both dependent variables. Strictly speaking, however, the joint contributions of parental expectations and family socioeconomic status continually accounted for more variance in aspirations than all the other factors combined. Hence, as far as this study is concerned, it appears as though the heart of the matter is in the conjugal (nuclear) family where many behavioural attitudes and values are engendered which lead to high aspirations and subsequent social class achievement by members of the next generation.

It is also interesting to note that the control variable, school peer group, accounts for considerably more variance than school environment. This finding would seem to infer that, even though school environment (generalized others) in and of itself may not be an important factor, the adolescent clique or subgroup (specific others) is an important factor in determining differential levels of post-secondary aspirations. More explicitly, it is the student's direct associates within the smaller school society that is the important factor (sociometric effects), not the overall socioeconomic composition of the school population itself (contextual effects). Future contextual studies might take this finding into account by shifting their primary focus from general interpersonal collectivities to specific personal collectivities.

The other two control factors, sex and intelligence, did not have statistically significant associations with either dependent variable. Since

these findings contradict much previous research, a posteriori intuitive explanation is warranted. With the advent of women's liberation and the promotion of equal educational and vocational opportunities for both sexes, aspirational differences between the sexes may no longer be an important factor. In fact, evidence from this study suggests that girls are not confining their aspirational levels to society's traditional expectations.

Similarly, intelligence (mental ability) may no longer be an important factor in aspirational type studies. With "educational inflation" running rampant, average or below average intelligence may not be seen as a barrier to university attendance and the highly skilled professions. Perhaps the criteria of academic success has shifted from high intelligence to determination, dedication, hard work, and enthusiasm.

Of course, the order in which the variables are entered in the regression equation affects the magnitude of each factor. More precisely, if sex and intelligence were entered first, they would account for more variance than they do in their present position. Regardless of position, however, neither variable makes a significant contribution to the variance in either dependent variable.

Variable ordering likewise accounts for some of parental expectations' large contributions, but overall it remains the most important factor in the model. At the same time, caution must be exercised since data on this variable were obtained from students rather than independently from the parents. The danger of student report measures lies in the fact that students may attribute to their parents the aspirations they hold for themselves. In other words, questionnaire responses could become reflections of what the students want their parents to project rather than what the parents actually expect.

According to Williams (1972, p. 118), however, evidence for the validity of student report data, although minimal, is nonetheless encouraging. Williams noted two unpublished doctoral dissertations which found that approximately seventy-eight per cent of the students reported their mother's expectations correctly. Thus, there is some support for the assumption which is made, namely that, even though student reports of referent expectations/aspirations are in close concordance with reality, they may be slightly overstated.

In the last analysis, it is expected that the dimensions employed in this model will provide a focus for further Canadian contextual research. Other factors unique to the home, school, and community need to be identified and isolated as a substantial proportion of the variance in both dependent variables remains unexplained. Hopefully, such research will lead to a clearer understanding of what types of contexts are most conducive to high post-secondary aspirations among Canadian youth in contemporary society.

References

- Alexander, C. N., Jr., & Campbell, E. Q. Peer influences on adolescent educational aspirations and attainment. *American Sociological Review*, 1964, 29 (August), 568-575.
- Anisef, P. *The critical juncture: Education and vocational intentions of grade 12 students in Ontario: Preliminary survey*. Toronto: Ministry of Colleges and Universities, 1973.

- Bain, R. K., & Anderson, J. G. School context and peer influences on educational plans of adolescents. *Review of Educational Research*, 1974, 44 (Fall), 429-446.
- Beilin, H. The pattern of postponability and its relation to social class mobility. *Journal of Social Psychology*, 1956, 44 (August), 33-48.
- Berdie, R. F. Why don't they go to college? *Personnel and Guidance Journal*, 1953, 31 (March), 352-356.
- Berdie, R. F. *After high school—What?* Minneapolis: University of Minnesota Press, 1954.
- Blalock, H. M. *Social statistics*. New York: McGraw-Hill, 1972.
- Blishen, B. R. A socioeconomic index for occupations in Canada. In B. R. Blishen, F. E. Jones, K. D. Naegle, & J. Porter (Eds.), *Canadian society*. Toronto: MacMillan of Canada, 1971, 495-507.
- Boocock, S. S. Toward a sociology of learning: A selective review of existing research. *Sociology of Education*, 1966, 39 (Winter), 27-32.
- Bordua, D. J. Educational aspirations and parental stress on college. *Social Forces*, 1960, 38 (March), 262-269.
- Boyle, R. P. The effects of the high school on students' aspirations. *American Journal of Sociology*, 1966, 71 (May), 628-639.
- Breton, R. *Social and academic factors in the career decisions of the Canadian youth*. Ottawa: Information Canada, 1972.
- Cattell, R. B., & Cattell, A. K. S. *Handbook for the Culture Fair Intelligence Test*. Champaign, Ill.: Institute for Personality and Ability Testing, 1960. (a)
- Cattell, R. B., & Cattell, A. K. S. *Manual for the Culture Fair Intelligence Test*. Champaign, Ill.: Institute for Personality and Ability Testing, 1960. (b)
- Clark, E., Cook, D., Fallis, G., & Kent, M. Socialization, family background, and the secondary school. In R. Pike & E. Zureick (Eds.), *Social reform and values in Canadian society*. Toronto: McClelland and Stewart Company, 1975, 77-103.
- Cohen, E. G. Parental factors in educational mobility. *Sociology of Education*, 1965, 38 (Fall), 405-425.
- Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., & York, R. L. *Equality of educational opportunity*. Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1966.
- Duncan, O. D., Haller, A. O., & Portes, A. Peer influences on aspirations: A reinterpretation. *American Journal of Sociology*, 1968, 74 (September), 119-137.
- Elder, G. H. Family structure and educational attainment: A cross-national analysis. *American Sociological Review*, 1965, 30 (February), 81-96.
- Fleming, W. G. *Ontario grade 13 students: Who are they and what happens to them?* Atkinson Study of Utilization of Student Resources, Report 2. Toronto: Ontario College of Education, University of Toronto, 1957.
- Fleming, W. G. *Characteristics and achievement of students in Ontario universities*. Atkinson Study of Utilization of Student Resources, Report 11. Toronto: Ontario College of Education, University of Toronto, 1965.
- Gordon, R. A. Issues in multiple regression. *American Journal of Sociology*, 1968, 73 (March), 592-616.
- Haller, A. O., & Butterworth, C. E. Peer influences on levels of occupational and educational aspirations. *Social Forces*, 1960, 38 (May), 289-295.
- Haller, A. O., & Miller, I. W. *The occupational aspiration scale*. Cambridge, Mass.: Schenkman Publishing Company, Inc., 1971.
- Haller, A. O., Otto, L. B., Meier, R. F., & Ohlendorf, G. W. Levels of occupational aspiration: An empirical analysis. *American Sociological Review*, 1974, 39 (February), 113-121.
- Haller, A. O., & Sewell, W. H. Farm residence and levels of educational and occupational aspirations. *American Journal of Sociology*, 1957, 62 (January), 407-411.
- Hauser, R. School and the stratification process. *American Journal of Sociology*, 1969, 74 (May), 587-611.

- Herriott, R. E. Some social determinants of educational aspiration. *Harvard Educational Review*, 1963, 33 (Spring), 157-177.
- Kahl, J. A. Educational and occupational aspirations of "Common Man" boys. *Harvard Educational Review*, 1953, 23 (Summer), 186-203.
- Karmel, B. Educational and employment aspirations of students: A probabilistic approach. *Journal of Educational Psychology*, 1975, 67 (February), 57-63.
- Kelly, H. H. Two functions of reference groups. In H. H. Hyman & E. Singer (Eds.), *Readings in reference group theory and research*. Toronto: Collier-MacMillan Canada Limited, 1968, 77-83.
- Kemper, T. D. Reference groups, socialization, and achievement. *American Sociological Review*, 1968, 33 (February), 31-45.
- Kerlinger, F. N., & Pedhazur, E. *Multiple regression in behavioral research*. New York: Rinehart and Winston, 1973.
- Marsden, L. R., & Harvey, E. B. Equality of educational access reconsidered: The post-secondary case in Ontario. *Interchange*, 1971, 2 (4), 11-26.
- McDill, E. L., & Coleman, J. S. Family and peer influences in college plans of high school students. *Sociology of Education*, 1965, 38 (Winter), 112-126.
- McDill, E. L., Meyers, E. D., Jr., & Rigsby, L. C. Institutional effects on the academic behavior of high school students. *Sociology of Education*, 1967, 60 (Summer), 181-199.
- Michael, J. A. High school climates and plans for entering college. *The Public Opinion Quarterly*, 1961, 25 (Winter), 585-595.
- Myer, J. W. High school effects on college intentions. *American Journal of Sociology*, 1970, 76 (July), 59-70.
- Nelson, J. I. High school context and college plans: The impact of social structure on aspirations. *American Sociological Review*, 1972, 37 (April), 143-148.
- Nie, N. H., Hull, C. H., Jenkins, J., Steinbrenner, K., & Bent, D. *Statistical package for the social sciences*. Toronto: McGraw-Hill Book Company, 1975.
- Pavalko, R. M. Socioeconomic background, ability, and the allocation of students. *Canadian Review of Sociology and Anthropology*, 1967, 4 (November), 250-259.
- Pavalko, R. M., & Bishop, D. R. Socioeconomic status and college plans: A study of Canadian high school students. *Sociology of Education*, 1966, 39 (Summer), 288-298. (a)
- Pavalko, R. M., & Bishop, D. R. Peer influences on the college plans of Canadian high school students. *Canadian Review of Sociology and Anthropology*, 1966, 3 (November), 191-200. (b)
- Pike, R. *Who doesn't get to university and why?* Association of Universities and Colleges of Canada. Ottawa: The Runge Press Ltd., 1970.
- Porter, M. R., Porter, J., & Blishen, B. R. *Does money matter? Prospects for higher education*. Toronto: Institute for Behavioural Research, York University, 1973.
- Rehberg, R. A., & Westby, D. L. Parental encouragement, occupation, education, and family size: Artifactual or independent determinants of adolescent educational expectations? *Social Forces*, 1967, 45 (March), 362-374.
- Sewell, W. H. Community of residence and college plans. *American Sociological Review*, 1964, 29 (February), 24-38.
- Sewell, W. H., Haller, A. O., & Straus, M. A. Social status and educational and occupational aspirations. *American Sociological Review*, 1957, 22 (February), 67-73.
- Sewell, W. H., & Shah, V. P. Parents' education and children's educational aspirations and achievements. *American Sociological Review*, 1968, 33 (April), 191-209. (a)
- Sewell, W. H. & Shah, V. P. Social class, parental encouragement and educational aspirations. *American Journal of Sociology*, 1968, 73 (March), 559-572. (b)
- Simpson, R. L. Parental influence, anticipatory socialization, and social mobility. *American Sociological Review*, 1962, 27 (August), 517-522.
- Tannenbaum, A. S., & Bachman, G. G. Structural versus individual effects. *American Journal of Sociology*, 1964, 69 (May), 585-595.

- Turner, R. H. *The social context of ambition*. San Francisco: Chandler Publishing Company, 1964.
- Williams, T. H. Educational aspirations: Longitudinal evidence on their development in Canadian youth. *Sociology of Education*, 1972, 45 (Spring), 107-133.
- Wilson, A. B. Residential segregation of social classes and aspirations of high school boys. *American Sociological Review*, 1959, 28 (December), 836-845.
- Wilson, P. B., & Buck, R. The educational ladder. *Rural Sociology*, 1960, 25 (December), 404-413.

University of Alberta Committee for the
International Year of the Child

Call for Papers for an IYC Conference

The University of Alberta Committee for the International Year of the Child is currently planning an interdisciplinary conference at the end of September, 1979. The conference is intended to bring together individuals *working in a Canadian context*, who are interested in the study of the child, for the purpose of sharing information, generating ideas, exploring what they have in common and how they can support each other. The programme themes include the developing child, the relating child, the learning child, and the child with special needs. Research papers are invited under the categories of: education, health, the child and the law, child growth and development, the child in the family, children's environments, the child in society, the child and government, the child and the humanities, and the child and agencies. For further information, please contact Conference Chairperson, Sheila Campbell, Department of Elementary Education, Faculty of Education, University of Alberta, Edmonton, Alberta, T6G 2G5, or phone (403) 432-5428.

C. C. ANDERSON

and

T. O. MAGUIRE

The University of Alberta

The Effect of TV Viewing on the Educational Performance of Elementary School Children

This study was designed to test the accuracy of the popular assumption that the extent of TV viewing has a negative effect on educational performance. Subjects in grades III and IV (N = 102) and V and VI (N = 198) were assessed on 14 variables: sex, socioeconomic status, the verbal and nonverbal IQ taken from the Canadian version of the Lorge-Thorndike Test of Mental Ability, achievement in a locally-standardized test of mathematics, the word meaning and paragraph comprehension sections of the Stanford Reading Test, two measures of behavioural impulsivity, and five measures of TV viewing (serious news, situation comedies, violent programmes, "kidvid" cartoons, and total TV viewing). Two-way ANOVAS (3 levels of TV viewing $\times$ 3 levels of IQ) disclosed no significant TV group effects on the three attainment variables. Minor findings concerned the significant positive relationship between extent of TV viewing and a test of behavioural impulsivity and, on one occasion, the present measure of social class. Future studies might investigate these points and eliminate some of the questionable methodological and measurement decisions made in this initial data-gathering venture. (Dr. Anderson and Dr. Maguire are Professors in the Department of Educational Psychology at The University of Alberta.)

The assumption that the extent of TV viewing, estimated by the frequency with which TV shows are watched by youngsters, is negatively related to their verbal and nonverbal attainment in school, is based on a mixture of factual reports and the climate of contemporary opinion.

(1) The assumption is tacitly accepted by the people who created "Sesame Street." Children are not being given the education they deserve (Lesser, 1975, p. 9), and "By the time these children graduate from high school, they will have spent on the average about 12,000 hours in school and about 15,000 hours watching television, having devoted more of their young lives to watching television than to any other single activity except sleep" (p. 19). There is an inference to be drawn about the cause-and-effect relationship between Lesser's statements.

(2) Teachers tend to believe that TV is the obvious culprit responsible for the decline in educational performance partly because it reduces the time available for homework and partly because youngsters would rather watch pictures than read print or listen to “talking heads” (Epstein, 1974, p. 263). Indeed salient contemporary models everywhere speak and write in a barbarous jargon characterized by, among other faults, ugly circumlocutions, plain bad grammar, clichés, the ambiguous use of words and phrases, and syntactical irregularities (Newman, 1976, pp. 4, 23, 30, 137). From this the inference to be drawn is that verbal rather than nonverbal attainment is more likely to be negatively affected by TV viewing.

(3) It has been asserted and illustrated that the debilitating effects of TV have their greatest influence on low achievers (Crandall, 1977, p. 36), a point which is consistent with the finding that low-income adolescents watch more TV than their higher-income counterparts (Liebert & Schwartzberg, 1977, p. 143).¹

If a relationship between income and TV viewing exists, then support for the relationship could be obtained by the simple process of gathering appropriate information from a representative sample of subjects. Unfortunately, the assumption and the sampling procedure seem to be at odds with Liebert and Schwartzberg’s other finding that “the brightest children were the heaviest television users” (Liebert & Schwartzberg, 1977, p. 143). Accordingly, it was decided that if achievement declines as a function of TV viewing, the evidence must be found from an analysis of the performance and responses of “bright” students.

A second hypothesis concerns the relationship between behavioural impulsivity and heavy viewing. This idea is derived from the view that commercial TV, as a marketing device, must promote impulse buying by associating its commercials with constantly changing and novel programmes. Moreover, impulsive children would seem to be excellent candidates for poor educational performance (Keogh, 1971, p. 106).

Method

Subjects

Five classes of subjects were tested and a comparison between the sample means and the 1975 performance of the complete school population on the Lorge-Thorndike Test of Mental Ability is given in Table 1. It is clear that, because the sample distributions are negatively skewed, they contain the target students, although the comparability of the standard deviations presents a problem, one solution to which may be that the schools chosen drew their students from a variety of neighbourhoods.

Measures

The children tested came from grades III ($N = 46$, 19 females); IV ($N = 56$, 28 females); V ($N = 108$, 54 females); and VI ($N = 90$, 46 females) in a metropolitan city in Western Canada. The sample was chosen because information about its members was accessible and because the students, on the average, were markedly superior, as has been shown, to the population

TABLE 1
DESCRIPTIVE STATISTICS BY GRADE LEVELS FOR
LORGE-THORNDIKE CANADIAN VERSION

	Grades			
	III and IV		V and VI	
	Mean	SD	Mean	SD
Verbal IQ Sample	117.9	15.2	113.0	15.4
City Norms	108.9	15.7	107.1	15.2
Non Verbal IQ Sample	114.9	14.5	114.6	13.8
City Norms	108.0	15.0	102.4	15.2

from which they were drawn. They were assessed on fourteen variables: sex, socioeconomic status, verbal and nonverbal IQ taken from the Canadian version of the Lorge-Thorndike Test of Mental Ability, achievement in a locally-standardized test of achievement in mathematics, the word meaning and paragraph comprehension sections of the Stanford Reading Test, two measures of behavioural impulsivity (Davids, 1971; Hirschfield, 1965), and five measures of TV viewing. The questionnaire² about television preferences offered the children 52 programmes, all of which were named by other children not participating in the investigation. Eleven programmes such as news and documentaries were classed as serious; there were 19 situation comedies, 14 violent programmes, mostly police shows such as "Kojak," and 8 "kidvid" cartoons with names like "Speed Bunny," "Hong Kong Phooey," and "Groovey Ghoolies." Although the cartoons are primarily violent in nature, they were placed in a separate category because they are designed for children.

The subjects were asked to place marks opposite programmes they regularly watched and were encouraged to write in favoured programmes not included in the list. For each child scores were derived for each of the shows by tallying the marks, and the total score consisted of all the marks made. That is, it was decided that the extent of TV viewing was reflected in the frequency with which TV programmes were watched. Alternative measures such as the number of hours watched were excluded because the child is better acquainted with the programmes watched rather than their temporal duration.

Socioeconomic status was estimated by placing the occupational status of the father (or that of the mother if hers were higher) on a six-point scale defined in terms of the amount of formal education received by the parent. Those with the highest sorts of education, usually in professional and managerial posts, were rated as 6 and made up 10 percent of the parents of children in the younger grades, 6 percent in the older; lower professional and administrative parents were rated as 5 (25 percent and 30 percent, respectively); those with some post high-school education such as typists and lower civil servants as 4 (26 percent and 32 percent); skilled manual workers such as mechanics and plumbers as 3 (29 percent and 24 percent); unskilled manual workers as 2 (9 percent and 8 percent) and the intermittently employed and the unemployed as 1 (1 percent and zero).

The hierarchy was arranged in terms of the extent of symbolic education because it was assumed, wrongly as it turned out, that people with the highest symbolic skills would be least likely to allow their children to watch TV a great deal, a possibility that would afford some support for the assumption of a positive relationship between TV viewing and educational attainment.

Results

TV Viewing

The following analyses were carried out after combining grades III with IV and V with VI because the differences in amount of TV viewing between the two younger and the two older groups were not significant whereas the difference between the two age-groups was very significant. The intercorrelations among the TV variables were calculated to ascertain whether a general score for TV viewing would be appropriate for further analyses. The results are shown in Table 2.

There are two interesting points about these correlations: a) the youngsters, especially in the later grades, tend to look at any kind of programme; b) it is a fair claim that, since 19 of the 20 correlations are significant and the correlations with the total are large, a general factor of TV viewing, measured by the total scores previously described, can be used as an independent variable for testing the accuracy of the idea that a negative relationship exists between number of TV shows viewed and educational attainment — at least, for this sample.

Preferred Sort of Programme

Information about the programmes selected most frequently in the categories is given in Table 3.

A Newman-Keuls comparison of the means showed marked differences among means for each of the two groups. The preference for situation comedies is lower in the younger group — 12 out of 19 (64 percent) compared to 14 out of 19 (74 percent). Heavy watching of the violent fare occurred only

TABLE 2
CORRELATIONS AMONG VIEWING PREFERENCES FOR STUDENTS
IN GRADES III—IV AND V—VI^a

KIDVID	---	.145	.282	.328	.599
SERIOUS	.421	---	.492	.396	.630
VIOLENT	.435	.376	---	.448	.782
SITCOM	.489	.320	.523	---	.822
TOTAL VIEWING	.751	.616	.797	.831	---

^a Grades III-IV correlations are shown above the diagonal (*N* = 102).
Grades V-VI correlations are shown below (*N* = 198).
(All correlations except .145 are significant at the .05 level).

TABLE 3
AVERAGE NUMBER OF PROGRAMMES SELECTED FROM
EACH CLASSIFICATION

Grade		Mean	SD	Number of Programmes Listed
III-IV	KIDVID	6.8	3.2	8
	SERIOUS	3.1	2.2	11
	VIOLENCE	8.9	4.0	14
	SITCOM	11.8	4.9	19
V-VI	KIDVID	5.4	3.1	8
	SERIOUS	2.9	2.3	11
	VIOLENCE	8.9	3.8	14
	SITCOM	13.7	4.5	19

with the “kidvid” in the younger group (7 out of 8 or 89 percent); these cartoons were less preferred at the older level (5 out of 8 or 62 percent). Programmes of adult violence were a steady attraction for both groups (9 out of 14 or 77 percent), although fewer in number than the comedies. As might be expected at these ages, the “serious” programmes (news and documentaries) exercised little appeal. One inference to be drawn from this is that the shows with greatest appeal will be mixtures of situation comedy (laced with sex) and violence, “Starsky and Hutch” and “Police Woman” being obvious examples. A later item analysis, not reported here, corroborated this prediction.

TV Watching and Educational Attainment

To examine the supposed influence of TV watching on verbal and mathematical attainment, two procedures were adopted. First, in each of the two grade groups, youngsters were divided into Low (<27), Medium (27-34) and High (>34) groups, based on the number of programmes watched. Analyses of variance were run on the three attainment variables and the results are shown in Table 4. In this analysis, “number of TV shows viewed”

TABLE 4
ANALYSIS OF VARIANCE OF AVERAGE VALUES ON ATTAINMENT
VARIABLES BY LEVELS OF TOTAL TV VIEWING

Variable	Grade	TV Group			F Ratio	Probability
		Low	Medium	High		
Mathematics	III-IV	85.3	74.9	74.6	2.1	.072
	V-VI	83.7	81.6	82.7	.21	.80
Word Meaning	III-IV	70.5	59.6	57.0	3.00	.054
	V-VI	69.9	63.8	60.2	2.75	.07
Paragraph Comprehension	III-IV	71.3	60.7	59.0	2.35	.10
	V-VI	70.6	64.6	66.1	1.19	.15

appears to have only a marginal negative relationship with achievement, the strongest being with vocabulary.

In the second procedure, the data were reanalyzed by blocking separately on verbal IQ (VIQ) and nonverbal IQ (NVIQ). Since the results were very similar, only those for VIQ are shown. The objective of the analysis was to see if the previous results were common to all IQ groups. Each of the two grade groups was divided into three VIQ groups: Low (≤ 110), Medium (111-130), and High (> 130). The frequencies are shown in Table 5.

TABLE 5
NUMBER OF STUDENTS IN IQ AND TV WATCHING GROUPS

TV Groups	IQ Groups			
	<110	111-130	>130	
<u>Grades III, IV</u>				
<27 Shows	8	18	8	34
27-34 Shows	11	15	8	34
>34 Shows	11	20	3	34
	30	53	19	
<u>Grades V, VI</u>				
<27 Shows	27	24	10	61
27-34 Shows	28	30	7	65
>34 Shows	27	27	8	62
	82	81	25	

Chi square tests carried out on the data shown in Table 5 indicated that the proportion of students in the TV group for the various VIQ groups were not significantly different in either grades III, IV ($\chi^2 = 3.9, p > .05$) or grades V, VI ($\chi^2 = 1.1, p > .05$). This suggests that the number of shows watched is relatively independent of VIQ level.

There were no significant interactions between VIQ and TV group in either of the two grade groups, for any of the dependent variables (mathematics, word meaning, and paragraph comprehension). Of course the VIQ main effects were significant, but that was to be expected. Only Word Meaning showed a significant TV group effect at the grade III, IV level. There were no significant TV group effects at the grade V, VI level. The group means are shown in Tables 6 and 7.

TV Watching, Behavioural Impulsivity and Social Class

Teachers' estimates of behavioural impulsivity of the younger children on Davids' Scale³ correlated significantly with extent of viewing violent programmes by the younger children (0.292), and also with all measures of TV viewing by the older children (0.350 for total viewing). This is consistent with the view that commercial TV, as a marketing device, promotes impulse buying and, in its programmes, drives away boredom by constant change (Schrank, 1976, p. 27).

TABLE 6
ACHIEVEMENT MEANS FOR GRADES III, IV FOR VIQ AND TV GROUPS

Verbal IQ	TV Group	Mathematics	Word Meaning	Paragraph Comprehension
Low	Low	70.9	39.4	43.9
	Medium	63.5	33.4	30.3
	High	51.5	37.9	36.8
Medium	Low	87.9	76.3	75.5
	Medium	80.3	64.2	69.1
	High	82.2	63.9	66.2
High	Low	94.1	88.8	89.1
	Medium	80.6	86.9	86.6
	High	86.0	81.3	92.0

TABLE 7
ACHIEVEMENT MEANS FOR GRADES V, VI FOR VIQ AND TV GROUPS

Verbal IQ	TV Group	Mathematics	Word Meaning	Paragraph Comprehension
Low	Low	74.9	56.3	56.7
	Medium	74.4	54.1	53.4
	High	74.5	47.5	49.3
Medium	Low	89.3	77.4	80.3
	Medium	95.3	67.6	69.3
	High	87.8	66.8	72.5
High	Low	93.9	89.1	85.1
	Medium	93.9	87.0	98.4
	High	93.0	80.9	80.3

TABLE 8
ANALYSIS OF VARIANCE OF TV VIEWING BY SOCIOECONOMIC
STATUS (GRADES V AND VI)

TV Groups	N	Mean SES	SD	
Hi	61	4.03	1.2	
M	65	4.91	1.0	$F = 2.96, p = .054$
Lo	62	3.67	.97	

The relationship, which came close to significance in the performance of the older groups, between TV viewing and the present measure of socioeconomic status is presented in Table 8. In a two-way ANOVA with the verbal IQ, the F -ratio was increased to 4.13 and the probability reduced to .018. This casts doubt on the original assumption that heavy TV viewing would characterize lower SES groups. It should be remembered, however, that the present SES measure is based on educational background.

Discussion

Limited conclusions can be drawn from an initial investigation in this area. Further studies of this sort are required at this and later age-levels; the amount of time spent watching must be compared to the shows seen as an index of TV viewing, and interviews conducted to determine the common features of the heavy viewer, especially the bright but bored (and possible impulsive) student. Again, the same tests should be given to the counterparts of members of this group, i.e., those whose school achievement is relatively poor. A replication of the present finding with such a group would support the tentative conclusion that the general assumption about the unpleasant effect of heavy TV watching may not be accurate.

Notes

1. It is possible to contend that this relationship between low-income youngsters and TV viewing is artificial and that the factors which cause this poor educational achievement are the lack of books, cultural events and parents who reward achievement. However, in this investigation, the findings do not support Liebert and Schwartzberg.
2. The questionnaire contained a list of 44 TV programmes, and the following instructions were given to the child: "Place a mark (✓) next to every TV programme which you usually watch (when it is on) because you like it."
3. Davids' Scale contains 7 traits isolated by clinicians as being associated with hyperactivity. The rater assigns a value of between 1 and 6 to each trait, 1 indicating a low occurrence of this behaviour in the child and 6 a high occurrence. The rated behaviours include hyperactivity, impulsiveness, irritability, and so on. The maximum score for all seven items is 42.

References

- Crandall, B. Decline in reading of the classics in public schools causes concern. *The New York Times*, May 29, 1977, pp. 1, 36.
- Davids, A. An objective instrument for assessing hyperkinesis in children. *Journal of Learning Disabilities*, 1971, 4 (8), 35-37.
- Epstein, E. *News from nowhere*. New York: Vintage Books, 1974.
- Hirschfield, P. P. Response set in impulsive children. *Journal of Genetic Psychology*, 1965, 107 (1), 117-126.
- Keogh, B. K. Hyperactivity and learning disorders. *Exceptional Children*, 1971, 38, 101-110.
- Lesser, G. S. *Children and television*. New York: Vintage Books, 1975.
- Liebert, R. M., & Schwartzberg, N. S. Effects of mass media. *Annual Review of Psychology*, 1977, 28, 141-173.
- Newman, E. *A civil tongue*. New York: Bobbs-Merrill, 1976.
- Schrank, J. *Snap, crackle and popular taste*. New York: Delta, 1977.

J. H. VANCE

University of Victoria

Attitudes Toward Mathematics and Mathematics Instruction of Prospective Elementary Teachers

Three Likert-type scales were used to investigate the attitude toward mathematics and beliefs about mathematics and mathematics instruction of prospective elementary teachers in three stages of preparation at the University of Victoria. Results indicate that students who have completed a content and a methods course in the mathematics preparatory program have more informal beliefs about mathematics and how it should be taught than students beginning the content course; i.e., they have a greater appreciation of the creative side of mathematics and stronger beliefs in the importance of discovery in learning mathematics. High achievers had more positive attitudes and more informal beliefs than low achievers. There were no differences between scale scores of students selecting primary and intermediate preparatory programs. (Dr. Vance is an Associate Professor in the Faculty of Education at the University of Victoria.)

A major objective in the preparation of elementary teachers of mathematics is the development in these prospective teachers of certain attitudes toward and beliefs about mathematics and how it is learned. It is assumed that teachers' attitudes towards mathematics will have a bearing on the way in which the subject is taught and on how well it is taught. A study by Phillips (1973) revealed that students who had had teachers with favourable attitudes towards mathematics in each of the three previous years had more favourable attitudes towards and higher achievement in arithmetic than students of teachers with unfavourable attitudes.

In an investigation of the attitudes of prospective teachers toward arithmetic, Dutton (1951) obtained written statements from 211 students in elementary methods classes. He reported that "deep-seated, highly emotionalized attitudes that had persisted since childhood" were prominent in the thinking of the prospective teachers as they progressed through the teacher education program. Dutton constructed a scale to measure attitudes toward mathematics. When comparing responses of a group of prospective teachers who completed the scale in 1954 and another group who responded

in 1962, he found that the attitudes of the two groups were almost identical (Dutton, 1962). Smith (1964), however, found that his sample was more favourably inclined toward arithmetic than Dutton's 1954 group. In a study of 287 students who had passed a content course and had completed the Dutton scale prior to and upon completion of the course, Todd (1966) found a significant gain in mean scores. Similar favourable results were reported by Reys and Delon (1968) in a study of students enrolled in one of three courses in a mathematics preparatory program, and by Hunkler and Quast (1972) who investigated the effects on student attitude of a content-methods course.

In recent years, increased emphasis has been placed on the informal and investigative nature of elementary school mathematics. Collier (1972) found that prospective teachers in later stages of an elementary education program, which included two content and one methods course in mathematics, had more informal views of mathematics and instruction in mathematics than students beginning their training.

The purpose of the present study was to compare the attitudes toward mathematics and the beliefs about mathematics and mathematics instruction of prospective elementary teachers at three stages of preparation at the University of Victoria. The attitudes and beliefs of high and low achieving students, students enrolled in primary and intermediate sections of a methods course, and students enrolled in a methods course with and without a particular content course as a prerequisite were also investigated.

Method

Scales

Three Likert-type scales were used, each consisting of 20 items — ten positive and ten negative — to which individuals respond according to a six-point interval from strongly agree to strongly disagree. The possible range of scores on each scale is 20 - 120.

The Attitude Toward Mathematics Scale (ATMS) is a modification of the Dutton-Blum (1968) scale. A score of 70 indicates a neutral attitude; a high score indicates positive or favourable feelings about mathematics; a low score indicates negative feelings.

The Belief About Mathematics Scale (BAMS) and the *Belief About Mathematics Instruction Scale* (BAMIS), constructed by Collier (1972), were designed to measure a formal-informal dimension of belief. A score of 70 on either scale is interpreted to represent a neutral point; scores greater than 70 are in the "informal" direction; scores less than 70 are in the "formal" direction. A high score on the BAMS indicates an appreciation of the creative and investigative nature of mathematics, as opposed to a view that mathematics is a closed, rigid subject. A high score on the BAMIS suggests a strong belief in the importance of student exploration and discovery, as opposed to teacher explanation, in learning mathematics.

Experimental Design

The scales were administered to various groups of prospective elementary teachers enrolled at the University of Victoria in the 1973-74 and 1974-75 academic years.

Students in the elementary education program are required to complete 3 units (two semesters) of approved mathematics and a 1½-unit mathematics methods course. Students not selecting mathematics as a teaching major generally fulfill the content requirement by taking Mathematics 160, “Fundamental Aspects of Mathematics for Elementary Teachers.” This course is taught by instructors from both the Mathematics Department and the Faculty of Education. The methods course, Education 744, “Curriculum and Instruction in Elementary Mathematics,” is taken by students in the “professional” or “diploma” year of their program. Successful completion of this year leads to initial certification as a teacher. A student selects a primary (K–3) or intermediate (4–7) section of the methods course.

Three stages of preparation were defined as follows:

I. Prior to taking Mathematics 160. The scales were administered to students enrolled in two sections taught by Faculty of Education instructors, during the first class in September, 1974.

II. Upon completion of Mathematics 160. The scales were administered to students enrolled in three sections taught by Faculty of Education instructors, near the end of the course in April 1974. The scales were also administered in April, 1975, to the two sections who had completed the scales at the commencement of the course the previous September.

III. Upon completion of Education 744. The scales were administered to students enrolled in three sections of the course in April, 1974, and in seven sections in April, 1975.

Achievement levels were defined for each stage as follows:

I. A high achiever had successfully completed both Math 11 and Math 12 in high school. A low achiever had completed Math 11 but not Math 12, which is not required for high school graduation nor for admission to the Faculty of Education.

II. A high achiever had completed Math 12 and obtained a grade of B or higher in Math 160. A low achiever had completed only Math 11 and obtained a passing grade in Math 160 of B– or lower.

III. A high achiever had completed Math 12 and obtained a grade of B or higher in both Math 160 and Education 744. A low achiever had completed only Math 11 and obtained passing grades of B– or lower in both university courses.

A 3 × 2 (preparation by achievement) design was used to compare scale scores of independent groups at the three stages and two achievement levels.

TABLE 1
CELL FREQUENCIES BY STAGE OF PREPARATION AND
ACHIEVEMENT LEVEL

Achievement Level	Stage of Preparation			
	I	II	III	All
High	21	28	34	83
Low	42	25	28	95
All	63	53	62	178

Table 1 gives the number of subjects in each cell. At each stage, only those students who had responded to the scales for the first time at that stage were included in the sample.

In order that longitudinal comparisons could be made, some students were tested at two different stages. Data were obtained for 46 subjects who completed the scales prior to and upon completion of Mathematics 160 in 1974-75, and for 27 subjects who completed the scales upon completion of Mathematics 160 in 1973-74 and upon completion of Education 744 in 1974-75. Pre- and post-test scores were compared using the correlated t-test.

Education 744 students who completed the scales near the end of the course in 1974 or 1975 were partitioned into two groups, first according to section chosen, primary (K-3) or intermediate (4-7), and then according to the content course taken to fulfill the mathematics requirement, Mathematics 160 or other. In each case mean scores were compared using the t-test.

Results

Three Stages and Achievement Level Comparisons

The mean scores for the three scales for groups at the three stages of preparation and two achievement levels are reported in Table 2.

A two-way ANOVA—least squares solution for unequal cell totals (Winer, 1962)—was performed for each scale to test for differences in the scores of students at the three stages of preparation and the two levels of achievement. The summary for these analyses is given in Table 3.

Because the *F* ratio for the preparation variable was significant for the

TABLE 2
MEAN ATMS, BAMS, AND BAMIS SCORES BY STAGE OF
PREPARATION AND ACHIEVEMENT

Achievement Level		Stage of Preparation			
		I	II	III	All
ATMS	High	91.9	94.3	93.9	93.3
	Low	82.8	79.8	87.1	83.3
	All	87.3	87.0	90.5	88.8
BAMS	High	73.2	74.8	76.9	75.0
	Low	69.9	69.6	76.9	72.1
	All	71.6	72.2	76.9	73.6
BAMIS	High	75.2	81.0	90.3	82.2
	Low	68.2	77.0	84.0	76.4
	All	71.7	79.0	87.1	79.3

Note. Overall sd for ATMS = 15.3, BAMS = 11.4, BAMIS = 14.0.

TABLE 3
ANOVA FOR PREPARATION AND ACHIEVEMENT

Source		df	MS	F	p
ATMS	Achievement (A)	1	4166	19.98	.00
	Preparation (P)	1	186	.89	.41
	P x A	2	217	1.04	.35
	Within	172	209		
BAMS	Achievement (A)	1	308	2.48	.12
	Preparation (P)	1	498	4.01	.02
	P x A	2	96	.77	.46
	Within	172	124		
BAMIS	Achievement (A)	1	1440	10.03	.00
	Preparation (P)	1	3689	25.70	.00
	P x A	2	35	.24	.79
	Within	172	144		

two belief scales, the Scheffé test was used to compare means at the three stages. For the BAMS, differences between scores at Stage I and Stage III were found to be significant, $p < .05$. For the BAMIS, differences between scores at Stage I and Stage II and between scores at Stage II and Stage III were significant, $p < .05$. As indicated in Table 3, the F ratios for the achievement variable were significant for the ATMS and the BAMIS, but not for the BAMS.

Test-Retest Comparisons

Scores of the groups of students who were tested at two different stages were analyzed using correlated t-tests. Mean scores and standard deviations at each stage and t-test results are presented in Table 4.

TABLE 4
MEANS AND STANDARD DEVIATIONS FOR THE ATMS, BAMS, AND
BAMIS AT TWO STAGES OF PREPARATION AND T-TESTS FOR
DIFFERENCES BETWEEN CORRELATED MEANS

		Stage of Preparation ($n = 46$)		t	p	Stage of Preparation ($n = 27$)		t	p
		I	II			II	III		
ATMS	$\bar{x}$	87.7	92.0	2.6	.01	83.7	89.0	2.6	.02
	sd	15.2	14.2			18.0	19.1		
BAMS	$\bar{x}$	70.4	74.7	2.7	.01	70.5	76.2	2.6	.02
	sd	9.1	10.4			12.4	12.1		
BAMIS	$\bar{x}$	71.6	73.9	1.3	.21	80.1	92.0	5.2	.00
	sd	11.2	12.9			12.1	11.0		

Section Type and Content Course Comparisons

Means, standard deviations, and t-test results comparing the students enrolled in Education 744, when classified according to type of section and to background content course, are presented in Table 5.

TABLE 5
MEANS, STANDARD DEVIATIONS, AND T-TEST RESULTS FOR SCHOOL
LEVEL AND CONTENT COURSE

		Section		t	p	Content Course		t	p
		Primary (n=114)	Inter- mediate (n=84)			Math 160 (n=130)	Other (n=64)		
ATMS	$\bar{x}$	93.6	94.9	.66	.51	93.4	95.8	1.13	.26
	sd	14.9	12.0			13.2	15.0		
BAMS	$\bar{x}$	78.0	79.7	.96	.34	78.9	78.4	-.27	.79
	sd	12.3	11.6			11.8	12.6		
BAMIS	$\bar{x}$	87.9	89.7	1.0	.32	89.1	87.9	-.60	.55
	sd	12.2	12.1			11.9	12.7		

Conclusions

1. Analysis of data from the independent groups at the three stages of preparation leads to the following conclusions:
 - (a) Students begin Mathematics 160, the first course in the mathematics program for elementary teachers, with fairly positive attitudes toward mathematics. The attitudes of students who have completed this content course and of students who have completed both the content course and the methods course, Education 744, do not differ significantly from those of students entering the program.
 - (b) Students begin the content course with neutral beliefs about mathematics along a formal-informal dimension. About the same views are held by students who have completed the content course, but students who have completed both the content and the methods course have a more informal view of mathematics than those beginning the first course.
 - (c) Students begin the content course with neutral beliefs about mathematics instruction. Students who have completed the content course have a more informal view than those beginning the course; those who have completed both the content and methods courses have a more informal view than students who are beginning or who have completed the content course.
 - (d) High achieving students in the elementary mathematics program have more favourable attitudes toward mathematics and a more informal view of mathematics instruction than low achievers. The

- two groups have about the same beliefs about mathematics along a formal-informal dimension.
2. Analysis of data from students who completed the scales at two successive stages of preparation leads to the following conclusions:
 - (a) Upon successful completion of the mathematics content course for elementary teachers, students possess a more favourable attitude toward mathematics and a more informal view of mathematics than they had prior to beginning the course. Student beliefs about mathematics instruction are about the same at the beginning and end of the course.
 - (b) Upon successful completion of the elementary mathematics methods course, students possess more favourable attitudes toward mathematics, and more informal beliefs about mathematics and mathematics instruction than they had upon completion of the content course for elementary teachers a year earlier.
 3. Analysis of data from students at the completion of the methods course leads to the following conclusions:
 - (a) There is no difference in attitudes toward mathematics, beliefs about mathematics, or beliefs about mathematics instruction between students who select a primary (K-3) preparatory program and those who choose an intermediate (4-7) preparatory program.
 - (b) Upon completion of the methods course, there is no difference in attitudes toward mathematics, beliefs about mathematics, or beliefs about mathematics instruction between students who fulfill the mathematics prerequisite to the course by taking Mathematics 160 and those who take another course.

Discussion

The overall results of the study indicate that students who have completed the content and methods requirements in mathematics of the elementary education program at the University of Victoria have more favourable attitudes toward mathematics, a greater appreciation of the creative side of mathematics, and stronger beliefs in the importance of encouraging learners to discover ideas for themselves and develop alternate methods for solving problems than students entering the program. Inasmuch as the development of positive attitudes and certain beliefs about the nature of mathematics and how it should be taught to school children is an important goal of the mathematics education program, these findings are encouraging. A previous study in the mathematical competence of prospective elementary teachers at these same three stages of preparation at the University of Victoria (Vance, 1973) indicated that student understanding of the number system and of arithmetic, as measured by tests from the Cooperative Mathematics Tests series, increased upon completion of Mathematics 160 and again upon completion of Education 744. The final level of performance on these two measures was considered satisfactory. Thus the mathematics education program appears to be effective, at least to some extent, in increasing mathematical competency of prospective teachers and in developing desirable attitudes toward mathematics.

It is perhaps not surprising that high achievers have more positive attitudes toward mathematics than low achievers. Keeping in mind the test-retest results at Stages II and III, an examination of Table 2 suggests that during the methods course, low achievers experience the greater gains in attitude scores. One possible explanation of the results regarding beliefs about mathematics and mathematics instruction is that a person who does well in mathematics is likely to be more aware of the creative nature of the subject and be more willing to encourage other learners to investigate and discover ideas for themselves than someone who feels insecure about mathematics. A teacher with a poor understanding of mathematics would likely feel more confident having pupils practice a demonstrated procedure than allowing them to explore freely, and perhaps ask questions on ideas unfamiliar to the teacher.

Kane (1968) found that prospective teachers who have relatively unfavourable attitudes toward mathematics prefer the primary grades, while those with the most favourable attitudes prefer the intermediate grades. This study indicates that students choosing the primary preparatory program and those selecting the intermediate program have approximately the same attitudes and beliefs about mathematics upon completion of their training. No attempt was made in the study to investigate student attitudes at the time the choice of program was made. In the competency study (Vance, 1973), no differences in the mathematical performances of these two groups were found.

Many students who are accepted into the "professional year" are transfers to the Faculty of Education, either from within the university or from another institution, usually a regional college. In addition, university graduates may qualify for certification as teachers by completing professional work in a "diploma" year. Most of these "transfer" and "diploma" students, and students choosing mathematics as a teaching major, fulfill the mathematics content requirement by taking a course other than Mathematics 160. The attitudes of such students prior to beginning the methods course were not examined, but it was found that, upon completion of the course, there was no difference in attitudes or beliefs about mathematics or mathematics instruction between these students and those who completed the mathematics course for elementary teachers at the University of Victoria. Similarly, in the competency study, no differences between the two groups were found on either the structure or the arithmetic test. Thus, the group of students who come into the methods course with a content prerequisite other than Mathematics 160 complete the course with about the same level of competence in mathematics as those who take Mathematics 160, and with similar attitudes about the subject and the way it should be taught in elementary school.

References

- Collier, C. P. Prospective elementary teachers' intensity and ambivalence of beliefs about mathematics and mathematics instruction. *Journal for Research in Mathematics Education*, 1972, 3, 155-163.
- Dutton, W. H. Attitudes of prospective teachers toward arithmetic. *Elementary School Journal*, 1951, 52, 84-90.

- Dutton, W. H. Attitude change of prospective elementary school teachers toward arithmetic. *The Arithmetic Teacher*, 1962, 9, 418-424.
- Dutton, W. H., & Blum, M. P. The measurement of attitudes toward arithmetic with a Likert-type test. *Elementary School Journal*, 1968, 68, 258-264.
- Hunkler, R., & Quast, W. G. Improving the mathematics attitudes of prospective elementary school teachers. *School Science and Mathematics*, 1972, 72, 709-714.
- Kane, R. B. Attitudes of prospective elementary school teachers toward mathematics and three other subjects. *The Arithmetic Teacher*, 1968, 15, 169-175.
- Phillips, R. B. Teacher attitudes as related to student attitude and achievement in elementary school mathematics. *School Science and Mathematics*, 1973, 73, 501-507.
- Reys, R. E., & Delon, F. G. Attitudes of prospective elementary school teachers towards arithmetic. *The Arithmetic Teacher*, 1968, 15, 363-366.
- Smith, F. Prospective teachers' attitudes toward arithmetic. *The Arithmetic Teacher*, 1964, 11, 474-477.
- Todd, R. M. A mathematics course for elementary teachers: Does it improve understanding and attitudes? *The Arithmetic Teacher*, 1966, 13, 198-202.
- Vance, J. H. The mathematical competence of prospective elementary teachers. Faculty of Education Reports, University of Victoria, 1973.
- Winer, B. J. *Statistical principles in experimental design*. New York: McGraw-Hill, 1962.

MENTAL RETARDATION BULLETIN

The *Mental Retardation Bulletin* is published for teachers, parents and professionals interested in current trends and research in mental retardation and related areas. It is published three times per year with contributions from medical practitioners, psychologists, speech pathologists, audiologists, administrators, teachers, and other interested professional and semiprofessional people.

Professional articles for the Bulletin are invited. Articles submitted for publication are reviewed by at least two referees. The Bulletin is abstracted by *Psychological Abstracts*.

Subscription rates are \$3.50 per year.

Address all communications to:

Mental Retardation Bulletin
Centre for the Study of Mental Retardation
6-123d Education North
The University of Alberta
Edmonton, Alberta, Canada
T6G 2G5

RICHARD L. DAFT

Queen's University
and

SELWYN W. BECKER

University of Chicago

School District Size and the Deployment of Personnel Resources

Deployment of personnel resources (salaries) are reported for 91 high school districts in the United States. The major finding is that educational functions received a smaller proportion of resources while overhead functions received a larger proportion of resources in large districts. Large school districts coped with the cost of large size by obtaining sufficient resources from the environment to support the disproportionately large overhead and service components. Implications for the evaluation and financing of school organizations are discussed. (Dr. Daft is an Assistant Professor in the School of Business at Queen's University; Dr. Becker is at the University of Chicago.)

Theorizing about the administrative costs associated with larger organization size has occupied economists (Knight, 1933; Stigler, 1966), sociologists (Blau, 1970), systems theorists (Boulding, 1953), and others. Most of these people agree that there are definite benefits to organization, but wonder whether, if beyond a certain size, the cost of administering or maintaining the organization begins to outweigh the benefits.

A great deal of empirical research has been undertaken to provide information about the relationship between organization size and the size of the administrative component. A recent review, for example, identified twenty-four studies that related size of administrative component to total organization size (Freeman & Kronenfeld, 1973), and additional research has been reported (Coates & Updegraff, 1973; Freeman, 1973; Kasarda, 1974; Evers, Bohlen & Warren, 1976). The empirical literature is by no means unanimous, but the ratio of administrative to production employees has been found to decrease with organization size across a variety of organization and industry settings. The pattern of administrative costs typically observed led Blau (1972) to conclude: "Contrary to the stereotype of the proliferation of bureaucratic machinery in large organizations, the administrative apparatus is proportionately smaller in large than in small organizations" (p. 6).

Similar findings characterize studies of school organizations. Hawley, Boland and Boland (1965) reported that the proportion of full-time university administrators decreased as faculty size increased. Large size was associated with a smaller administrative ratio in a study of urban school systems in Western Canada (Gill, 1967). Another study of Western Canadian school systems reported the same cross-sectional finding, although no decrease in administrative ratios within districts was observed over a five-year period (Holdaway & Blowers, 1971). Studies by Lindenfeld (1961), Bidwell and Kasarda (1975), and Hendershot and James (1972) all reported a smaller proportion of administrators in larger districts in the United States. The only finding of a larger administrative ratio in large districts was reported by Terrien and Mills (1955) for California school systems.

Two other types of research bear on the issue of administrative costs. In the one case, Rushing (1967), James (1972), and Kasarda (1974) all found that the ratio of clerical employees to production employees increased as organization size increased. The implication of these findings is that true administrative economies may not exist. Instead, as organization size increases, personnel simply may be redeployed from one part of the administrative function (top administrators) to another (clerical). The net effect of this personnel reallocation may or may not constitute administrative efficiency for the organization.

The other type of finding concerns the proportion of professional staff specialists. Typically, professional staff constitute a larger proportion of personnel in large organizations (Kasarda, 1973; Bidwell & Kasarda, 1975; Holdaway & Blowers, 1971). This may reflect a greater division of labour in large organizations or a greater need for staff specialists when the organization serves a large population.

Thus, the issue of proportional administrative costs and personnel deployment is complex. Multiple functions compete for resources within organizations, and some functions, such as administration and clerical, may partially substitute for one another. To properly understand the relationships among size, personnel deployment and administrative costs, all functions, line and staff, must be considered.

The study reported here was undertaken to assess the relationship between size and the deployment of personnel resources in school organizations. All functions in the district, including teaching, administrative activities, and staff specialists, are included. Moreover, the study deals with salaries associated with each functional activity. Salaries represent the true cost to the district of providing administrators, clerks or teachers.¹ The analysis thus provides insight into the relative dollar cost of functions across districts of varying sizes.

Size and Deployment

The basic premise is that large districts are intrinsically different from small ones, that both have different personnel requirements even when they have similar goals and technologies. Small districts are expected to have a structure that is relatively simple. Supervision and control is typically exercised on a personal basis in small organizations. In addition, small

communities may not contain the diverse educational needs found in larger population centres. Hence small districts probably will not be faced with the diversity of resource demands faced by large districts. Large districts, like other large organizations, are expected to be bureaucratized and complex (Hall, 1972). Pugh, Hickson, Hinings and Turner (1969) found that large organizations employ greater use of rules and procedures. Meyer (1968) reported that large organizations also tend to have larger spans of control and a larger number of both vertical levels and horizontal divisions.

The complexity and bureaucratic characteristics of large districts can be expected to have two influences on resource allocation. First, rules, procedures, and other formal communications are important sources of coordination and control. Consequently those groups responsible for the formal paperwork systems will have to be proportionately bigger and receive proportionately more resources in large organizations. Evidence of the greater requirement for formalized communications in large organizations is the positive relationship between the clerical ratio and size, reported by Rushing (1967), James (1972) and Kasarda (1974).

Second, large district size can have the opposite relationship with administrative personnel. It has already been noted that administrators frequently comprise a smaller proportion of personnel in large school organizations (Hawley et al., 1965; Holdaway & Blowers, 1971; Bidwell & Kasarda, 1975). The explanation for smaller administrative ratios is that large organizations utilize rules, larger spans of control, impersonal communication, and other devices in place of personal supervision. In large organizations the administrative savings can be allocated to other administrative functions, such as clerical, or to the teaching core which provides services to the public.

Large districts will also differ from small districts with regard to specialized educational services. Large organizations experience a greater division of labour; tasks are subdivided and specialists are hired to do these tasks. Large districts typically function in large, heterogeneous communities, and thus tend to experience demand for a greater range of educational services (Holdaway & Blowers, 1971). Moreover, large districts can afford the cost of new specialists more easily than small districts. A \$15,000 salary takes a smaller proportion of the total budget in a large district. When the need for a new educational service is recognized, a large district can respond with a new service or department.

The other major functions in school organizations are maintenance and teaching, but the deployment of resources to these functions has not been widely studied. Child (1973) concluded that the maintenance component increased at about the same rate as organization size. The maintenance component in school districts is expected to increase at least as fast as district size. The larger the district the greater will be physical plant size, geographical dispersion, and diversity of equipment and facilities. The maintenance support function will have to grow to support the increase in physical size and physical complexity of the district. Problems of transportation, sophisticated equipment, and large plant may even require the acquisition of maintenance personnel at a rate faster than the increase in total district size.

There is not a great deal of evidence in the literature on the proportion of resources allocated to teaching component of schools, or to the technical core (Thompson, 1967) of other organizations. Most studies have been concerned only with administrative or clerical personnel, or perhaps staff specialists. Holdaway (1971b) reported that in Western Canadian school districts, the percentage of salaries going to instruction decreased as district size increased. Holdaway (1971a) also found that the proportion of instructional salaries was higher in metropolitan areas organized into multiple systems rather than into a single large school system. Large districts appear to face diverse needs from both within (bureaucratization) and without (specialized services), so the classroom teaching core of large districts will probably receive a reduced share of resources. Other functions will compete for and receive a greater share of resources in large districts. If this happens, large districts may have to ration teaching services (fewer teaching resources per pupil), or obtain greater per student revenues from the environment to support the diverse internal activities.

In summary, administrators were hypothesized to take a smaller proportion of resources in large districts, but clerical personnel, staff specialists, and perhaps maintenance personnel were expected to require a larger proportion of resources. The net effect would be a smaller share of resources for teachers unless sufficient revenues are obtained to support the non-teaching functions.

Method and Procedures

Ninety-one high school districts in the mid-western United States during the 1970-71 school year constituted the sample for this study. The districts were located in the same state, and the sample included all districts with more than 500 students that were organized as four-year high school districts (grades 9-12). Neither elementary (grades K-8) nor mixed (K-12) districts were included. Four year high school districts have wide variation in size with the sample ranging from 535 to 16,035 students.

The district sample was selected to be fairly homogeneous. One advantage of this approach allows for partial control for the effects of variables other than size that might influence personnel deployment. For example, the districts function under the same state's rules and regulations concerning educational services, financing procedures, and district operations. The districts also have a similar purpose (grades 9-12 education) and deal with similar educational technologies.

The disadvantage of this sample is the limited generalizability of the results. A single type of district was selected and all districts in that category were included. The sample could even be considered a "population" because there is not a larger universe with the same characteristics from which the sample was drawn. To some extent the findings may generalize to the same districts in other years, or to four-year districts in states or provinces with a similar legal and financial environment. In general, however, the findings should not necessarily be interpreted as representative of other district populations.

The primary function of high schools is classroom teaching, so resources

devoted to that activity were allocated to the technical core. School districts also provide a range of other services including lunch programs, adult education, guidance counselling, speech therapy, athletics, health, and special education. Some of these services closely support classroom teaching while others do not, so they were divided into two groups: (1) auxiliary educational services that support classroom teaching, and (2) other student and community services. Other services tend to broaden the base of education to include non-classroom activities and to provide services to adults and others in the community.

Each school district files an annual financial statement with the state superintendent of public instruction. The salaries expended for each major function in the district were obtained from the financial statements. Teachers and other district participants occasionally worked in more than one activity, so salaries were prorated according to the time spent on each function. The variables used in the analysis and the salary categories included in each variable are listed below. The latter three variables measure sources of revenue to test how large and small districts obtain revenues to handle their personnel requirements. The data are for the 1970-71 school year.

Administration. Salaries for all individuals involved in the administrative function: superintendents, principals, their assistants, supervisors, coordinators, business managers, and department heads (ADMIN).

Classroom Teachers. Salaries for teaching services rendered to students (TEACH).

Auxiliary Educational Services. Salaries for personnel who provide services to students in support of classroom education. This category includes guidance and psychological counsellors, librarians, health, teacher aids, and audio-visual personnel (AUXED).

Other Student and Community Services. Salaries for personnel involved in other student and community programs which include adult education, summer school, lunch, athletics, manpower development and training, and economic opportunity project (SERV).

Clerical Support. Salaries for secretaries, clerks, and personnel who monitor attendance and textbooks (CLER).

Operations and Maintenance. Salaries for personnel involved in the operation and maintenance of buildings, equipment, grounds, and transportation (MAINT).

Community Tax Revenues. Income from local school district property taxes (COMM).

State Flat Grant. State funds provided to districts on a per pupil basis (STATE).

Other Programs. Special programs supported by state and federal governments (bilingual education, special education, driver education) (PROGS).

The data were analyzed by computing the elasticity coefficient of the salaries paid in each functional component with respect to total salaries paid in the district. The elasticity coefficient is the percentage difference in

component salaries associated with a one percent difference in size (total salaries) across the districts in the sample. An elasticity of 0.8, for example, would mean the component salaries increased only 80 percent as fast as total salaries, hence the component received a smaller proportion of resources in large districts. An elasticity of 1.2 would mean the functional component received a larger proportion of resources in large districts. An elasticity of 1.0 would mean that component salaries changed at the same rate and received the same proportion of resources across all districts. The elasticity of each component shows whether personnel resources are deployed in a different fashion as districts vary in size.

The technique used to identify elasticities is to compute the simple linear regression of the form:

$$\text{Log } Y = \text{Log } a + b \text{ Log } X \quad (1)$$

where Y = the salaries deployed to some district component, X = total salaries paid in the district, and $\text{Log } a$ is the $\text{Log } Y$ intercept. The regression coefficient “ b ” is the elasticity of the dependent variable with respect to changes in the independent variable (Rubinfeld, 1971). The “ b ” coefficient also indicates the curvilinearity of Y with respect to X in the raw data. When $b = 1$ for example, the relationship is linear (straight line), indicating that both variables increase at the same rate. When $b > 1$ a regression line fitted to the raw data would have a slight upward curve, and when $b < 1$ a regression line will have a slight downward curve. Estimating elasticities with equation (1) has been recommended for assessing the proportional size of organizational components (Freeman & Kronenfeld, 1973), and has been so used by Coates and Updegraff (1973), Ackers and Campbell (1970), and Pondy (1969). Elasticity analysis is widely used by economists (Johnston, 1972; Chiang, 1967), and has also been used in studies of educational expenditures (Sharples, 1974).

A specific hypothesis was tested for each personnel component. The common null hypothesis (H_0) was that the size of each component changed at the same rate as district size. The alternative hypothesis (H_1) for maintenance, clerical, other student and community services, and auxiliary educational services was that component size changed faster than district size (the component received a larger share of personnel resources in larger districts). The alternative hypothesis (H_1) for administration and teaching was that component size changed more slowly than district size (the component received a smaller share of resources in larger districts).

If $b = 1.0$ for a component, the null hypothesis is supported. The alternative hypotheses were tested by computing the t -value for the difference between 1.0 and the observed b coefficient ($t = [1.0 - b]/[\text{s.d. of } b]$).

The data used in this study are cross-sectional in nature, and the limitations of cross-sectional data should be emphasized. The relationship between school district size and personnel resource deployment will be assessed by comparing across districts. The findings will not demonstrate that changes in size over time within a single district will have the same outcomes.

Results

The data in table 1 show how the size of each school district component changes with respect to district size. The administrative component received a smaller proportion of salaries in large districts. The size of the administrative component increased only 94 percent as much as district size across the districts in the sample. This finding is not strongly significant ($p < .075$), but is in the expected direction.

TABLE 1
PERCENTAGE CHANGE IN SUBUNIT SALARIES ASSOCIATED WITH
CHANGES IN TOTAL SALARIES

Subunit	Elasticity	Statistical Significance
ADMIN	0.94	<.075
TEACH	0.95	<.0001
AUXED	1.22	<.055
SERV	1.18	<.03
CLER	1.27	<.0001
MAINT	1.15	<.0001

N = 91. Statistical significance computed for difference between elasticity coefficient and 1.0.

The district components which clearly increased their proportion of salaries are clerical and maintenance. The salaries allocated to clerical increased 28 percent faster than total salaries, and maintenance increased 15 percent faster. These relationships are highly significant ($p<.0001$). The support requirements for written communications and physical plant apparently were much greater in large districts. These salaries can be considered as overhead because they don't contribute directly to student education. These overhead salaries comprised a larger share of total salaries as district size increased.

Nonteaching educational services also received a larger share of total salaries in larger districts. Salaries for auxiliary educational services increased 22 percent faster than total salaries ($p<.055$). Salaries for other services to students and community increased about 19 percent faster than total salaries ($p<.03$). These services appear to be proportionately more important in terms of relative size in large districts.

The finding for the teaching core was as expected. Resources allocated to classroom teaching changed only 95 percent as fast as changes in total salaries across these districts. For each doubling of salaries across districts, salaries for classroom teaching changed by only 95 percent. The remaining resources were diverted to clerical, maintenance, and nonteaching educational services in the larger districts. Approximately two thirds (67.2 percent) of the salaries in all of the districts went to classroom teaching. But over the range of districts in our sample, the smaller share of resources of classroom teaching could be a substantial amount: the largest district is approximately 30 times as large as the smallest district.

Table 2 provides some additional data on salary allocation. Components are combined to show the net efforts of changes in size. The combined salaries for administration and clerical changed 6 percent faster than total salaries. This means that savings in the administrative component were more than used up by proportionately larger clerical components in large districts. Adding maintenance to clerical and administration gives some indication of the change in total overhead costs as district size changes. Combined overhead salaries increased 10 percent faster than total salaries.

TABLE 2
PERCENTAGE CHANGE IN COMBINED SUBUNIT SALARIES
ASSOCIATED WITH CHANGES IN TOTAL SALARIES

Subunits	Elasticity	Statistical Significance
ADMIN & CLER	1.06	<.025
ADMIN, CLER & MAINT	1.10	<.0001
TEACH & AUXED	0.97	<.0001
TEACH, AUXED & SERV	0.975	<.0001

N = 91. Statistical significance computed for difference between elasticity coefficient and 1.0

The other two figures in Table 2 show what happens if the teaching core is defined differently. Many educators would argue that providing auxiliary services to students and other services to the community are critical functions for high schools to perform. When salaries for these other services were added to salaries for classroom teaching, the teaching core received a slightly larger proportion of resources than when teaching alone was considered (.975 in Table 2 vs. .95 in Table 1). But the core still received a smaller proportion of salaries in large districts. If these organizations are divided into two components — one including all educational services, the other including all overhead salaries — the overhead component increases faster than the educational component. Thus the evidence supports the notion that large districts cost proportionately more to operate than small districts. There are apparently no administrative economies of scale for school districts of the sizes observed here when administration is defined to include all overhead salaries.

Figure 1 translates the findings from Tables 1 and 2 into graph form. The lines indicate the change in personnel salaries for school districts of different sizes. Solid lines represent changes in specific functions; broken lines indicate the changes in total overhead and total educational salaries. The lines on the graph oversimplify the variance in the data, but the slopes indicate the trends across the 91 school districts. The percentage of salaries going to teachers dropped from over 70 percent in the small districts to about 59 percent in the large districts. Total educational services (TEACH, AUXED, SERV) dropped from about 82 percent to 72 percent of total salaries. Total overhead costs (ADMIN, CLER, MAINT), on the other hand, increased from about 18 percent to 28 percent of salary costs.

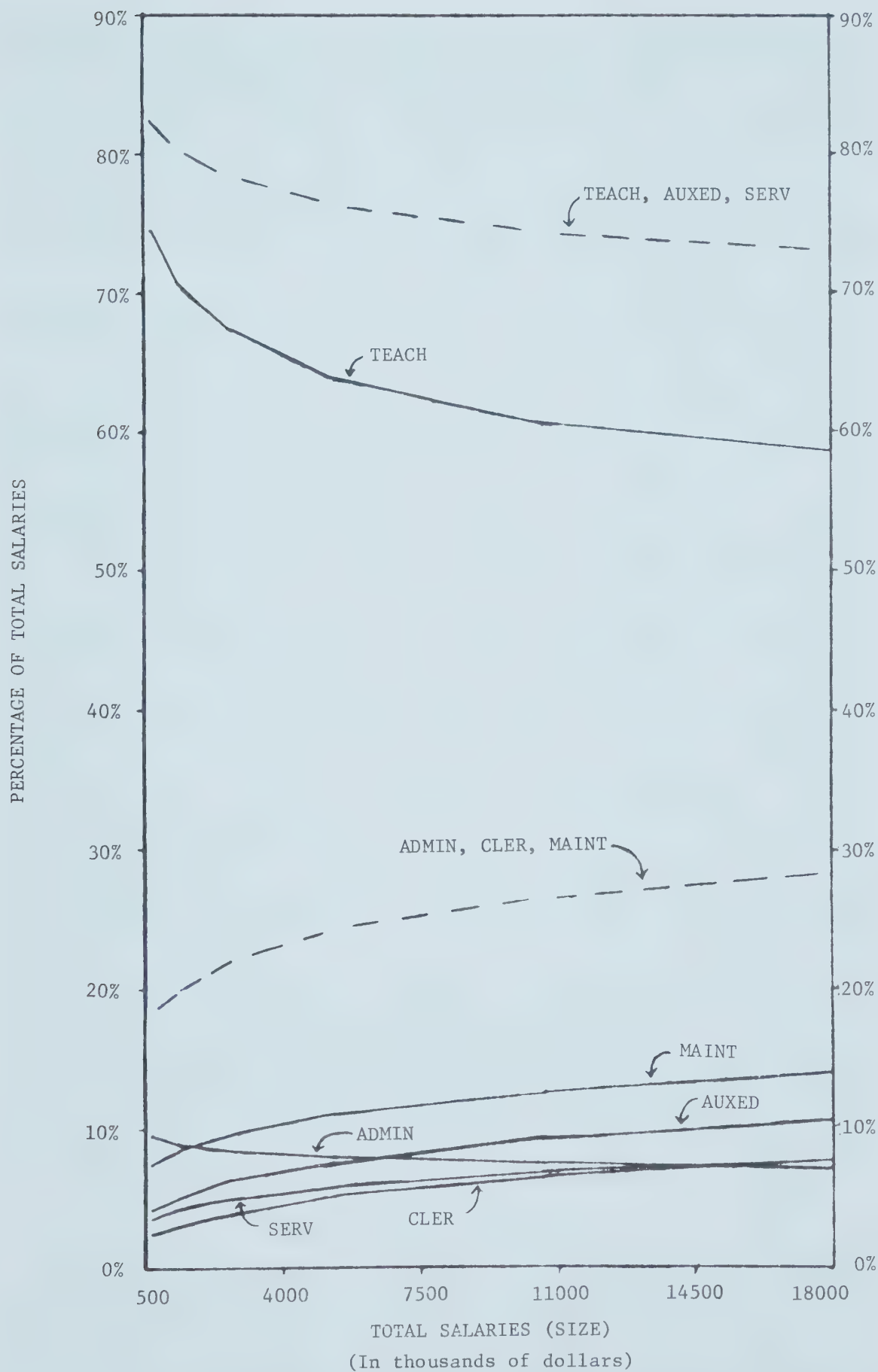


Figure 1. Percentage of salaries allocated to each component as a function of district size.

If administrative economies do not exist in large districts, how can this problem be handled? Large districts either have to reduce teaching resources per student, or obtain additional resources. Additional resources would enable large districts to allocate salaries to overhead and nonteaching components and still provide comparable resources to classroom teaching.

The amount and source of revenues in districts of varying sizes can be examined with the same kind of analysis. If teaching salaries per student are smaller in large districts, then the elasticity of teacher salaries with respect to students should be less than 1.0. These data are in Table 3.

The elasticities in Table 3 are all greater than 1.0. This means that salaries paid in every component, including classroom teaching, are greater per pupil in large districts, the reason as explained by the last figure in Table 3 being that total salaries paid in the districts change almost 14 percent faster than student enrollment. Large districts in this sample are apparently more successful in obtaining resources because they spend more salary dollars per pupil. The allocation of salaries within the districts is the same as before, of course, with teachers and administrators receiving less than the other components as size increases. But total resources to be divided among the components was proportionately greater in large districts. Large districts apparently supported disproportionately large overhead and auxiliary service components and still provided approximately 8 percent more salary dollars to classroom teachers. For this school district sample the notion can be rejected that rationing of teaching services will occur, i.e., that large districts will expend fewer teaching resources per student as a method of supporting the increasingly large administrative and maintenance apparatus.

Some of the greater teaching salaries per pupil spent in large districts may be due to the following factors: (1) higher wage rates in urban areas, (2) higher ratios of teachers to pupils, (3) more highly educated teachers or (4) more experienced teachers. Thus, higher teacher salaries per pupil may reflect more teachers, higher wages, or more highly educated and experienced teachers. The data do not indicate exactly how the additional salaries per

TABLE 3
PERCENTAGE CHANGE IN SUBUNIT SALARIES ASSOCIATED WITH
CHANGES IN STUDENT ENROLLMENT

Subunits	Elasticity	Statistical Significance
ADMIN	1.07	<.075
TEACH	1.08	<.0006
AUXED	1.42	<.005
SERV	1.35	<.002
CLER	1.45	<.0001
MAINT	1.31	<.0001
TOTAL	1.14	<.0001

N = 91. Statistical significance computed for difference between elasticity coefficient and 1.0

TABLE 4
PERCENTAGE CHANGE IN RESOURCE INPUTS ASSOCIATED WITH
CHANGES IN STUDENT ENROLLMENT

Resource Sector	Elasticity	Statistical Significance
COMM	1.19	<.0001
STATE	0.99	<.45
PROGS	1.03	<.26

N = 91. Statistical significance computed for difference between elasticity coefficient and 1.0

pupil are spent. But large districts are able to support larger overhead components and more educational specialists, and still deliver more dollars per pupil to the classroom.

If teaching dollars are not restricted in large districts, and if overhead and auxiliary educational components are proportionately larger, who supports these activities? The relationship between origin of financial support and organization size is shown in Table 4. School district revenue in the U.S. comes from three sources: community taxes; state flat grants; and federal, state and local programs. Districts have little control over state flat grants, but can influence to some extent the income from other sources.

The data in Table 4 show that large districts received greater financial support from the local community. Income from state grants and other programs increased about the same rate as student enrollment, but income from local community taxes increased about 19 percent faster than student enrollment. These data do not indicate whether this increase can be attributed to a greater tax base in larger communities or whether large districts simply extract a larger share of available community resources.

The relationship between size and program funding is somewhat unexpected. Large school districts might be better equipped to obtain funds from state and federal programs to provide specialized classroom and community services. The third coefficient (1.03) in Table 4 indicates that this is not the case. Most program funding is a subsidy to encourage the school to adopt the program. Funds are there for the taking which, apparently, most schools do. The amount paid reflects the school's size. Large districts do not appear to have an advantage in obtaining revenues to provide specialized educational functions, but they do obtain more revenues from the local community.

Discussion and Conclusions

The expectations concerning the allocation of resources within the school districts are generally supported. The salaries devoted to administration take a smaller percentage of total salaries in large school districts. One explanation is that larger districts are administered with the use of impersonal communication and control devices such as budgets, memos and written procedures. These impersonal methods may save administrators but

they require additional clerical services and personnel. The additional resources consumed by the clerical group more than offset the saving in administrators. The maintenance component was also proportionately larger in the large districts and added to the overhead costs. The net effect was that overhead functions required a larger percentage of personnel costs in larger districts. In large school districts a larger share of salary resources was also allocated to educational services other than teaching. This finding reflected the greater demand for diverse services to meet the educational needs of a large student body and a more heterogeneous community population.

The deployment of personnel to overhead and nonteaching educational services led to the most important finding that a smaller percentage of salary resources were channelled into the teaching core in large school districts. Classroom teaching received the majority of resources in each district, but it was clearly a smaller proportion in large districts.

The data also indicated that large districts were able to obtain sufficient resources from the local community to meet the requirements associated with large size. Lortie explains this by suggesting that large school districts are better able to coopt other people and organizations in their environments, and hence are able to secure the support necessary to obtain funding for the various programs.²

The finding that large districts have proportionately greater overhead costs is consistent with Holdaway's (1971a, 1971b) studies of Canadian school systems. Holdaway found noninstructional costs higher in larger districts. Other studies of the administrative component typically examined only administrative personnel, or clerical personnel, or staff specialists. The total cost of the overhead machinery was understated in those studies because the combined cost of overhead functions was not tested. By examining resource deployment throughout the school organizations, the opposite result is found. Overhead costs are proportionately greater in large rather than small districts.

The impact of size and revenues has implications for public policy decisions regarding the delivery of educational services. It is often proposed that districts be financed on a uniform per pupil basis (Guthrie et al., 1974). In this way inequities across districts in the provision of educational services supposedly will be removed. But the findings above suggested that uniform financing may not equalize educational services because large districts allocate proportionately more resources to overhead activities. Under uniform financing a smaller percentage of the educational dollars may reach the classroom in larger districts. Larger districts may have difficulty meeting requirements for overhead costs and for nonteaching services, and still provide comparable resources to classroom teaching. The problem of financing public services in a nearly equal manner affects many types of public organizations. New alternatives, such as uniform financing of technical core activities and unequal financing of support activities, may offer a better solution than uniform financing on a per capita basis.

Another implication of the above findings concerns the evaluation of performance in schools. Typically outputs are difficult to define and measure. Hence there is often a tendency to evaluate school organizations on the basis of resource inputs such as the cost of personnel, equipment, or supplies. But

small districts may appear to be more efficient on the basis of certain financial cost ratios. Overhead costs will be proportionately higher in large districts, but this may be because of legitimate requirements for greater clerical and maintenance services. The performance evaluation of large and small districts should allow for different cost requirements.

These findings also have implications for administrators within educational organizations. In large districts, administrators should be prepared to invest in overhead activities. The large organizations have greater requirements for paperwork, other written communications, and maintenance. These requirements appear to be legitimate, so administrators should not restrict the overhead functions because of the belief that only the teaching core does important work. Moreover, support activities may make teaching personnel more effective. Administrators should also be cautious about comparing their performance to other districts on the basis of cost ratios. Useful comparisons are most likely to be observed when districts are similar in size.

In conclusion, there appear to be mixed blessings associated with large district size. The large districts in this sample provided more specialized services, and they were able to obtain sufficient revenues to meet a variety of organizational and educational requirements. But proportional costs of overhead personnel were greater. More research is clearly needed into the allocation and utilization of resources in school organizations. Many questions remain to be answered. If, for example, research can determine whether the proportionately greater overhead cost associated with large size is related to output, then investigators can say more about how school organizations should be organized. Perhaps school organizations would utilize resources more efficiently by delivering services with groups of small, specialized organizations rather than with large, consolidated ones.

Notes

1. Salary costs in a function may be influenced by local wage rates, employee qualifications, and the number of personnel in the function. Daft (1976), however, reported that the use of salary costs yielded the same results as number of personnel in organizational analysis, because number of personnel is by far the most important determinant of salary costs.
2. Professor Dan C. Lortie, Department of Education, University of Chicago — personal communication.

References

- Ackers, R., & Campbell, F. L. Size and the administrative component in occupational associations. *Pacific Sociological Review*, 1970, 13 (Fall), 241-251.
- Bidwell, C. E., & Kasarda, J. D. School district organization and student achievement. *American Sociological Review*, 1975, 40 (February), 55-74.
- Blau, P. M. A formal theory of differentiation in organizations. *American Sociological Review*, 1970, 35 (April), 201-218.
- Blau, P. M. Interdependence and hierarchy in organizations. *Social Science Research*, 1972, 1, 1-24.
- Boulding, K. E. Toward a general theory of growth. *The Canadian Journal of Economics and Political Science*, 1953, 19 (August), 326-340.
- Chiang, A. C. *Fundamental methods of mathematical economics*. New York: McGraw-Hill, 1967.
- Child, J. Parkinson's progress: Accounting for the number of specialists in organizations. *Administrative Science Quarterly*, 1973, 18, 328-348.
- Coase, R. H. The nature of the firm. *Economica* (New Series), 1933, 4, 386-405.

- Coates, R., & Updegraff, D. E. The relationship between organizational size and the administrative component of banks. *Journal of Business*, 1973, 47 (October), 576-588.
- Daft, R. L. Organization size and the administrative component: An empirical test of some measurement issues. Paper presented at the American Sociological Association Meetings, August 30-September 3, 1976.
- Evers, F. T., Bohlen, J. M., & Warren, R. D. The relationship of selected size and structure indicators in economic organizations. *Administrative Science Quarterly*, 1976, 21, 326-342.
- Freeman, J. H. Environment, technology, and the administrative intensity of manufacturing organizations. *American Sociological Review*, 1973, 38 (December), 750-763.
- Freeman, J. H., & Kronenfeld, J. E. Problems of definitional dependency: The case of administrative intensity. *Social Forces*, 1973, 52 (September), 108-121.
- Gill, N. The relationship between the size of urban school systems and certain characteristics of their administrative staffs. Unpublished Master's thesis, The University of Alberta, 1967.
- Guthrie, J. W., Kleindorfer, G. B., Levin, H. M., & Stout, R. T. *Schools and inequality*. Cambridge: MIT Press, 1971.
- Hall, R. H. *Organizations: Structure and process*. Englewood Cliffs, N. J.: Prentice-Hall, 1972.
- Hawley, A. W., Boland, W., & Boland, M. Population size and administration in institutions of higher education. *American Sociological Review*, 1965, 30 (April), 252-255.
- Hendershot, G. E., & James, T. F. Size and growth as determinants of administrative production ratios in organizations. *American Sociological Review*, 1972, 37 (April), 149-153.
- Holdaway, E. A. Staffing metropolitan school districts. *The Canadian Administrator*, 1971, 10 (April), 29-33. (a)
- Holdaway, E. A. Multiple school jurisdictions and staffing practices. *Manitoba Journal of Education*, 1971, 6 (June), 18-23. (b)
- Holdaway, E. A., & Blowers, T. A. Administrative ratios and organization size: A longitudinal examination. *American Sociological Review*, 1971, 36 (April), 278-286.
- James, T. F. The administrative component in complex organizations. *Sociological Quarterly*, 1972, 1 (Fall), 533-539.
- Johnston, J. *Econometric methods*. New York: McGraw-Hill, 1972.
- Kasarda, J. D. Effects of personnel turnover, employee qualifications and professional staff ratios on administrative intensity and overhead. *Sociological Quarterly*, 1973, 14 (Summer), 350-358.
- Kasarda, J. D. The structural implications of social system size: A three level analysis. *American Sociological Review*, 1974, 39 (February), 19-28.
- Knight, K. E. *The economic organization*. Chicago: The University of Chicago, 1933.
- Lindenfeld, F. Does administrative staff grow as fast as organization? *School Life*, 1961, 43, 20-23.
- Meyer, M. W. Two authority structures of bureaucratic organizations. *Administrative Science Quarterly*, 1968, 13.
- Pondy, L. Effects of size, complexity and ownership on administrative intensity. *Administrative Science Quarterly*, 1969, 14 (March), 47-60.
- Pugh, D. S., Hickson, D. J., Hinings, C. R., & Turner, C. The context of organization structures. *Administrative Science Quarterly*, 1969, 14, 91-114.
- Rubinfeld, D. L. *Statistical analysis of economic and financial data*. Cambridge: Dynamics Associates, Inc., 1971.
- Rushing, W. A. Two patterns of industrial administration. *Human Organization*, 1967, 26 (Spring/Summer), 32-39.

- Sharples, B. Responsiveness of educational expenditures to factors of economic growth. *The Alberta Journal of Educational Research*, 1974, 20, 198-207.
- Stigler, G. *The theory of price*. New York: MacMillan, 1966.
- Terrien, F. W., & Mills, D. L. The effect of changing size on the internal structure of organizations. *American Sociological Review*, 1955, 20 (February), 11-13.
- Thompson, J. D. *Organizations in action*. New York: McGraw-Hill, 1967.

G. D. EWERT

and

H. L. JANZEN

The University of Alberta

Iconic and Immediate Memory in Elementary School Children

The effects of five variables in Iconic and Immediate Memory in elementary school subjects (sex, age, grade, exposure time, and stimulus density) were studied using a simultaneous presentation of consonant letter stimulus items and immediate recall. The data were collected individually from 240 subjects (20 subjects for each age-grade combination in the elementary school) using tachistoscopically controlled exposures and oral recall. The results indicated that all variables, with the exception of the sex of the subject, were significant factors in Iconic and Immediate Memory. As age and grade increased, recall on all tasks increased significantly. The results of increasing exposure time and stimulus density on recall indicated that the younger subjects (up to eight years of age in grade three) tended to recall fewer letters whereas the older subjects tended to increase the number of letters recalled. The study suggests that subjects in grades three to six demonstrate a fully developed Iconic Memory capacity but only the subjects in grade six show a functionally developed Immediate Memory capacity for storage and recall of letters. This study, therefore, supports the basic concept of the stage-theory of the structure of memory. (Dr. Janzen is an Associate Professor in the Department of Educational Psychology; Mr. Ewert is a doctoral student in the same department.)

Without a doubt, the primary activity required for school children (and everyone else, for that matter) is to process information, whether visually, aurally, or tactually. Theories from the time of William James' (1890) to Miller's (1956) to Sperling's (1960) to Norman's (1969) research clearly support the concept of memory on two dimensions, one being a short-term recall factor, the other the capacity to process information. Conceptual refinement by contemporary researchers (Kumar, 1971) and utilization of information processing theory suggested the concept of memory as an active participant in the processing of information.

The present study utilized Keele's (1973) concept of the basic structure of memory as comprising of: (1) Sensory Register (SR) or Iconic Memory (IcM),

(2) Short-Term Memory (STM) or Immediate Memory (IM), and (3) Long-Term Memory (LTM). Keele (1973) suggested that these stages can be distinguished from each other by time and space. The constructs of Iconic Memory and Immediate Memory, however, have been developed primarily with data from adult subjects. While elaborating the model, this has provided little information about the development of these constructs in children.

In this paper, the conceptualization of the iconic memory system is assumed to involve central processing, it being recognized that in most memory systems, only peripheral processes may be operating (Turvey, 1973). In Turvey's research, where the relevant features of recall included location, size, and color (retrieval cues with the partial report), one can see why he suggests that iconic memory consists of a series of peripheral visual systems. In the case where not the *critical physical features*, but the *associative features* (such as whether an item is a digit or letter; or recall of a series of letters) are measured, a more central system is used. It is this latter interpretation that this study follows (Baddeley, 1976). Whether peripheral or central, it should be stated that the systems probably work in parallel at different processing rates, depending on other factors such as exposure time and stimulus density. In the case where the information must be extracted from an iconic store and held for a short duration, it is probable that iconic memory does require complex cognitive processing.

Iconic Memory

The capacity of Iconic Memory is larger than the amount of information transferred into Immediate Memory (Sperling, 1960). At the Iconic level of processing the loss of information is primarily due to the rapid decay of the visual trace (Neisser, 1967); however, in the case of partial reports (Sperling, 1960; Averbach & Coriell, 1961), the loss of information also occurs due to the selection of specific items for recall. In Iconic Memory, the capacity established by the free recall of stimulus items briefly displayed indicates the recoding capacity from the rapidly decaying visual trace into verbal storage for recall (Sperling, 1960). This recoding capacity may more easily be conceptualized as the transfer capacity, the amount of information that can be transferred (recoded) from the rapidly decaying visual trace into verbal storage for oral recall. This transfer capacity of Iconic Memory is, in this study, of more interest than the absolute capacity, as established by estimations from the partial report recall method used by Sperling (1960) and Averbach and Coriell (1961). Although the actual size of the Iconic Memory capacity may be no different among subjects in elementary school, the amount of usable information that can be recoded from the absolute capacity may change as age and grade levels change.

Although Haith (1971) reported a lack of significant age differences in visual processing speed for single geometric figures presented tachistoscopically, he did report significant differences in recall between younger and older subjects for presentations of multiple stimuli. Teichner and Sadler (1962) found that at brief exposure times (up to 500 milliseconds), item recall for adults was positively related to stimulus density. If, as Haith's results indicate, increased stimulus density is negatively correlated with recall in younger subjects, the development of Iconic Memory may be best investigated by establishing the particular age-grade level at which recall in

an Iconic Memory task is positively related to stimulus density. If, as the results reported by Teichner and Sadler (1962) and Haith (1971) suggest, the positive relationship between recall and stimulus density is a major distinguishing feature in comparing the recall of the mature with the younger subjects, one could therefore hypothesize that subjects whose recall increases as stimulus density increases, have a functionally matured Iconic Memory.

Immediate Memory

In Immediate Memory, the loss of information is primarily due to the lack of rehearsal of the items (Norman, 1969; Kumar, 1971). In contrast to the Short-Term Memory task, the Immediate Memory approach is not concerned with how many trials are required before a subject achieves perfect recall; rather, this method is concerned with the number of items a subject can recall after one simultaneous exposure of the items. Blankenship (1938) defined memory span as the ability of an individual to reproduce immediately, after one presentation, a series of discrete stimuli in their original order. This latter whole-report approach is the one the present study will be using.

The finding that recall on Immediate Memory and Short-Term Memory tasks is positively related with age has been well established (Blankenship, 1938; Dornbush & Basow, 1970; McCarver, 1972). These findings did not, however, attempt to distinguish between the age and educational effects of the development of Immediate Memory. Subjects of the same age level, but in different grade levels, may not perform similarly on Immediate Memory tasks. The difference in grade level, as well as age, may be reflected in a difference in recall on Immediate Memory tasks.

Corsini (1971) states that the development of Immediate Memory is directly related to the ability to use mnemonic strategies. The problem in the present study was to demonstrate that the increased recall related to age increases (Blankenship, 1938; McCarver, 1972) may be due to the development of mnemonic strategies for recall in Immediate Memory. The most effective method to resolve this dilemma is the use of two stimulus densities, one with a relatively light information load of six letters, the other with a relatively high information load of twelve letters (which would be well beyond the capacity of any of the subjects to recall completely). The recall for the complex stimulus array of those subjects, with mnemonic strategies for processing complex stimulus arrays, should be significantly greater than the recall of those subjects lacking the necessary mnemonic strategies. The difference in recall may also be demonstrated between the subject's recall for the two stimulus densities at the same exposure time as well as over a variety of exposure times. If the recall for the low density stimulus array is always greater than the recall for the high density arrays, one could conclude that the necessary mnemonic strategies for processing the high information arrays may not have been developed. Further, if the recall for the high or low density arrays did not increase, or if in fact, the amount recalled decreased as the exposure time increased, this result would seem most indicative of the lack of development of the necessary mnemonic strategies. Therefore, it may be postulated that the age-grade level, at which the subject's recall of the stimulus items for both stimulus arrays increases as the exposure time increases, would indicate a functionally developed Immediate Memory.

Research Postulate

Since previous research in Iconic and Immediate Memory using school-age subjects is lacking, the present study did not formulate specific hypotheses. Rather, the major postulate under investigation was to examine age-grade differences in recall for two different stimulus densities and varying exposure times in two stages of the memory model. For those subjects whose Iconic capacity is functionally mature (as measured by a consistently greater recall on the twelve-letter condition as compared to the six-letter condition), it is postulated that their recall on Immediate Memory tasks will be consistently *greater* than those subjects whose Iconic Memory is functionally immature (as measured by a consistently greater recall on the six-letter condition as compared to the twelve-letter condition). Analysis of results across age groups should indicate, therefore, the necessity of a functionally effective Iconic Memory as a prerequisite for the development of an effective Immediate Memory. If this is indeed the case, the descriptive model of memory processes (Keele, 1973) would also be applicable as a developmental model.

Procedure

Subjects

Two hundred and forty school subjects participated in the study. Ten males and ten females for each age-grade combination were randomly selected and tested. The subjects were drawn from two urban elementary schools in Edmonton and one suburban elementary school in Sherwood Park.

Apparatus

A Polymetric Company Tachistoscope Model V-0959T (234 South Eight Street, Reading, Pennsylvania, U.S.A.) was used to present the visual stimulus cards. The visual stimulus cards were eighteen 3- by 5-inch plastic covered white cards: one card with twelve digits, eight cards with six consonant letters, and nine cards with twelve consonant letters. Cards with twelve letters or twelve numbers on them had a $\frac{1}{4}$ -inch space between the items. The cards with six letters on them had a $\frac{1}{2}$ -inch space between the items. All letters were centered with a one-inch border on each side and a 1-29/32 inch margin on the top and bottom of these cards. The consonants and numbers were $\frac{1}{4}$ - by 3/16-inch in size and were chosen from a Letrite 4 printing set. The pre- and post-exposure field was a plastic covered white card.

Method

When the subject entered the testing room he was asked to sit on a chair placed in front of the tachistoscope. The subject was asked the grade level he was in and how he enjoyed school. Some informal conversation was always engaged in with the subject to allow time for some of the strangeness of the experimenters and the situation to dissipate before testing started. The subject's name, grade, age, birth date, testing date, and sex were recorded on the data sheet. Two experimenters were always in attendance, one to record

the biographical and response data, the other to give the instructions and to administer the tasks. The order of testing followed a standard procedure which paralleled the hypothesized developmental order of Iconic Memory, and then Immediate Memory. This order of presenting the task was the most efficient as each task introduced the task that followed, giving the testing situation a natural progression from task to task rather than jumping from one task to another.

The procedure and instructions will be presented under the appropriate sub-headings which will name the factor that was being investigated at that time.

Iconic Memory. The subject was seated on a chair in front of the tachistoscope when the following instructions were given:

I am going to flash something very quickly on the white screen at the back of this box (referring to the tachistoscope). I am not going to tell you what I will flash. I want you to tell me what you see.

At this time the subject was positioned with his face fitting snugly into the face guard on the tachistoscope in order to keep out extraneous light.

I want you to keep your face in this head guard as tightly as possible. I want you to look at the screen at the back. Just before I flash the things on the screen I will say "READY," then I will flash them. Do not worry if you cannot see them right away, they are flashed so quickly that most people may not be able to see them right away. All right? "READY."

At this point the first exposure of stimulus items was given at the 200 millisecond exposure level. Two exposures were given, one of letters and one of numbers. Whether the numbers or letters were presented first depended upon the order given to the preceding subject. If the preceding subject had been given the letters first, the following subject was exposed to the numbers first and so on, to avoid a bias towards which stimuli would be recognized more quickly than the other. If the subject did not recognize the items presented, alternate trials of letters and numbers were presented at each 100 millisecond increment level until both sets of stimuli were recognized. Each unsuccessful exposure level was marked on the data sheet as an "x" and the successful trial was marked with a check-mark. The instructions attempted to reassure those subjects who would not immediately recognize the stimuli flashed and also attempted to ensure attention at the proper time by the use of a cue before the exposure. The subject was also praised for his performance in the following manner:

You did very well on that part. You see that was not so hard was it?

The exposure level at which the subject recognized letters as letters was used as the exposure level for the six trials presented in the Iconic Memory tasks. The subject was instructed:

Now, this time I am going to flash more letters on the screen. They will flash just as quickly as they did before but this time I want you to tell me as many of the letters you saw as you can. I will say "READY" and then I will flash the letters. Remember, as soon as the letters flash tell me as many of the letters you saw as you can. All right? "READY."

The letters were in groupings of 6 and 12 letters per card, with three presentations of the six-item displays, and three presentations of the twelve-item displays. The order of presentation was either: 6, 12, 12, 6, 6, 12 or

12, 6, 6, 12, 12, 6 depending on the order used for the previous subject. The order used alternated from subject to subject in order to randomize out a recall bias due to seeing a 6-item versus a 12-item display first. After each exposure the letters recalled were recorded as well as the card number and the order of presentation. Those subjects who recalled the entire or the most part of the alphabet were cautioned to recall only those letters that they actually saw. A new stimulus card was then presented as the first trial. If the subjects persisted in randomly recalling strings of letters with no relationship to the stimulus items, they were at this point thanked for their participation in the study, returned to their classroom, and deleted from the study. With the subjects continuing in the study, testing continued until a total of three 6-item and three 12-item displays were responded to. If a subject responded that he could not see the items, the particular card was set aside and shown again at the end of the original exposure order. Any card exposed more than once was noted on the data sheet. Since more subjects were tested than required for this study, those subjects having no recall and those requiring more than one extra exposure of stimulus cards were deleted from the study. After each exposure the subject's recall was responded to by the experimenter in the following manner:

That's very good, try this one.

At no time during testing were the subjects told whether the 6- or 12-item display was going to be shown.

Immediate Memory. Upon completion of the six trials for Iconic Memory performance the subject was instructed:

You did very well on that part, now this time I am going to show you more letters but this time you will have a much longer time to look at them. That will make it easier for you to remember them won't it? (pause for the subject's response). This time though, I want you to remember the letters from left to right in the same order that you see them (at this point the subject was shown the letter stimulus card used for establishing the Recognition Threshold and shown with the aid of this card what was required). Remember, when the letters disappear you tell me as many of the letters that you saw as you can, but please remember them in order. Do not repeat the letters out loud while they are on the screen, but as soon as they disappear tell me, in the correct order, as many of the letters as you can remember.

The order of presentation was the opposite of the order used in testing Iconic Memory performance, either 12, 6, 6, 12, 12, 6 or 6, 12, 12, 6, 6, 12. The first pair of 6 cards were exposed for 3 seconds, the second pair for 6 seconds, and the final pair for 9 seconds. After the last 3- and 6-second exposure and prior to the first exposure at the next time level, the subject was instructed:

This time you will have a longer time to look at the letters. Remember to tell me the letters in the order they were on the screen.

After each attempt by the subjects to recall the items they were told:

That's very good, now try this one.

Those subjects who persisted in recalling letters randomly or who could not recall any letters after any one of the exposures of stimulus items were deleted from the study.

When testing was completed, if the subjects wished to examine the tachistoscope, they were shown how it worked. They were not given any information which could affect the performance of another subject to whom

they might talk. In general, the subjects who were the first from the classroom were slightly apprehensive and an attempt was made to make them feel comfortable. The younger subjects in particular were instructed after the testing was completed:

You did very well on that. You see it was not hard at all, in fact it was rather fun, wasn't it? (pause for subject's response). Be sure to tell the rest of your class how much fun it was, but don't tell them what we did because we want to surprise them.

Some subjects with partial blindness, a recent illness, or subjects who had engaged in a vigorous physical exercise just prior to testing were deleted from the study. The testing session was designed to last approximately five minutes in order to ensure a high level of subject attention and performance during testing. The actual time taken varied from five to seven minutes, depending on the age of the subject. The younger subjects usually required additional repetitions of the instructions.

Throughout all testing, the whole-report technique was utilized.

Results

Analysis

A one-way analysis of variance with a Newman-Keuls comparison between ordered means was used to examine the between-group differences. A three-way analysis of variance was used to examine the effects within and between groups on the variables "stimulus density," "exposure level," and "sex" of subject. Since grade level was confounded with age, it was decided not to analyze grade as a separate factor, but concentrate primarily on age as the developmental variable. All programs used were supplied by the Division of Educational Research, University of Alberta, Edmonton, Canada.

The results of 240 elementary school subjects were obtained for all Iconic Memory and Immediate Memory variables. Each grade level included two age groups whose average age difference for the total sample was 7.26 months. Each age level, with the exception of the six- and twelve-year-olds, occurred in two grade groups. The average age difference between subjects of the same age but different grade level was 4.26 months. The subjects in the higher grade tended to be slightly older than their age-mates in the lower grade. In each group an equal number of male and female subjects were tested.

Table 1 shows the means and *F*-ratios for all groups over all variables. All the *F*-ratios are significant at the .01 level or greater. Tables 2 to 9 present the results of the Newman-Keuls comparison of ordered means for each variable used in the study.

Iconic Memory (IcM₆, IcM₁₂). The number of letters correctly recalled tended to increase as age and grade increased. Tables 2 and 3 show the mean recall for the six- and twelve-letter displays respectively for each age-grade group with the stimulus exposure at each individual's specific letter recognition exposure level.

In Table 2 for the six-letter displays (IcM₆), I-6 subjects had significantly lower recall than all other groups. This finding reveals a significant age

TABLE 1
ONE-WAY ANALYSIS OF VARIANCE WITH GROUP MEANS
AND F-RATIOS

Groups ^a	Variables							
	Ic.M/6	Ic.M/12	IM (3/6)	IM (3/12)	IM (6/6)	IM (6/12)	IM (9/6)	IM (9/12)
I-6	1.2015	1.2835	2.7000	2.9000	3.0000	2.3500	3.2500	2.6500
I-7	1.6665	1.9670	3.3000	2.9000	2.8500	2.2500	3.1500	2.3000
II-7	2.1830	2.0500	3.7000	3.2500	3.6500	2.6000	3.8000	3.0500
II-8	2.0340	1.9340	2.8000	2.9500	3.4000	2.1500	3.2000	2.5000
III-8	2.7325	2.6995	4.3000	3.7000	4.8500	3.2500	4.6000	3.8000
III-9	2.5505	3.0505	4.7000	4.0000	4.9500	4.1000	5.2000	4.5000
IV-9	2.6655	2.9500	4.4500	4.1000	4.6000	3.9500	5.0500	4.8500
IV-10	2.6670	2.7320	3.8500	3.9000	4.2500	3.3000	4.5500	3.7500
V-10	2.2665	2.6995	4.3500	4.1500	4.8000	3.3000	5.4500	4.1500
V-11	2.9325	3.1495	4.4000	3.9500	4.9000	4.2000	5.0500	4.0000
VI-11	2.6830	2.8825	4.8500	4.4500	5.2500	4.4500	5.4000	5.1500
VI-12	2.9995	3.4160	4.8000	4.3000	5.2000	4.8500	5.0500	5.3000
F-Ratio	10.87	10.74	8.84	4.28	10.45	10.80	13.83	13.70

Note. An F-ratio of 3.66 is significant at the .01 level.

^a N = 20 for each age-grade group, matched by sex.

TABLE 2
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF ICONIC
MEMORY RECALL FOR SIX LETTERS

Groups	Mean	Groups											
		VI-12	V-11	III-9	IV-9	VI-11	IV-10	III-8	V-10	II-7	I-7	II-8	I-6
VI-12	2.999	-----						*	*	*	*	*	*
V-11	2.932	-----							*	*	*	*	*
III-8	2.732	-----								*	*	*	*
VI-11	2.683	-----								*	*	*	*
IV-10	2.667	-----								*	*	*	*
IV-9	2.665	-----								*	*	*	*
III-9	2.550	-----									*	*	*
V-10	2.266	-----									*	*	*
II-7	2.183	-----										*	*
II-8	2.034	-----										*	*
I-7	1.666	-----										*	*
I-6	1.201	-----											*

* indicates $p < .05$

difference between I-7 subjects and I-6 subjects. However, III-8 subjects show significantly greater recall than II-8 subjects.

In Table 3 for the twelve-letter displays (IcM₁₂), I-6 subjects had significantly lower recall than all other groups. All the older subjects (III-8 to VI-12) showed significantly greater recall for the twelve-letter displays than the younger subjects (I-6 to II-8). The trend for the younger subjects (I-6 to II-8) to recall fewer letters than the older subjects (III-8 to VI-12) is noticeable in the six-letter condition, but is only statistically significant for the twelve-letter condition.

Immediate Memory (IM₃₋₆, IM₃₋₁₂, IM₆₋₆, IM₆₋₁₂, IM₉₋₆, IM₉₋₁₂). Tables 4 and 5 show the mean recall of all groups for the six- and twelve-letter displays respectively at the three-second exposure level (IM₃₋₆, and IM₃₋₁₂).

In Table 4 for the six letter displays, all older subjects (III-8 to VI-12) have significantly greater recall than subjects in I-6 and II-8. With the exception of IV-10 subjects, all older subjects (III-8 to VI-12) have significantly greater recall than I-7 subjects for the six-letter display.

As can be seen in Table 7, for the twelve-letter display, with exception of groups III-8, IV-10 and V-10, all older groups have significantly greater recall than all younger subjects (I-6 to II-8). In addition, both age groups in grade six (VI-11 and VI-12) have significantly greater recall than the subjects in groups III-8, I-10 and V-10.

Tables 8 and 9 show the mean recall for all groups for six- and twelve-letter displays respectively at the nine-second exposure level (IM₉₋₆ and IM₉₋₁₂). This nine-second exposure level provides the most complete

TABLE 3
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF ICONIC
MEMORY RECALL FOR TWELVE LETTERS

Groups	Mean	Groups											
		VI-12	V-11	III-9	IV-9	VI-11	IV-10	III-8	V-10	II-7	I-7	II-8	I-6
VI-12	3.416	-----								*	*	*	*
V-11	3.149	-----								*	*	*	*
III-9	3.050	-----								*	*	*	*
IV-9	2.950	-----								*	*	*	*
VI-11	2.882	-----								*	*	*	*
IV-10	2.732	-----								*	*	*	*
III-8	2.699	-----								*	*	*	*
V-10	2.699	-----								*	*	*	*
II-7	2.050	-----											*
I-7	1.967	-----											*
II-8	1.934	-----											*
I-6	1.283	-----											

* indicates $p < .05$

TABLE 4
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF
IMMEDIATE MEMORY RECALL FOR SIX LETTERS AT THE
THREE-SECOND EXPOSURE LEVEL

Groups	Mean	Groups											
		VI-11	VI-12	III-9	IV-9	V-11	V-10	III-8	IV-10	II-7	I-7	I-6	II-8
VI-11	4.85	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*	*
VI-12	4.80	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
III-9	4.70	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
IV-9	4.45	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
V-11	4.40	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
V-10	4.35	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
III-8	4.30	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
IV-10	3.85	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*
II-7	3.70	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
I-7	3.30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
I-6	2.85	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
II-8	2.80	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* indicates $p < .05$

TABLE 5
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF
IMMEDIATE MEMORY RECALL FOR TWELVE LETTERS AT THE
THREE-SECOND EXPOSURE LEVEL

Groups	Mean	Groups											
		VI-11	VI-12	V-10	IV-9	III-9	V-11	IV-10	III-8	II-7	II-8	I-7	I-6
VI-11	4.45	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*	*
VI-12	4.30	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
V-10	4.15	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
IV-9	4.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	*	*	*
III-9	4.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
V-11	3.95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
IV-10	3.90	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
III-8	3.70	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
II-7	3.25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
II-8	2.95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
I-7	2.90	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
I-6	2.90	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* indicates $p < .05$

TABLE 6
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF
IMMEDIATE MEMORY RECALL FOR SIX LETTERS AT THE
SIX-SECOND EXPOSURE LEVEL

Groups	Mean	Groups											
		VI-12	VI-11	V-11	III-9	IV-9	V-10	IV-10	III-8	II-7	I-6	I-7	II-8
VI-11	5.25	-----							*	*	*	*	
VI-12	5.20	-----							*	*	*	*	
III-9	4.95	-----							*	*	*	*	
V-11	4.90	-----							*	*	*	*	
III-8	4.85	-----							*	*	*	*	
V-10	4.80	-----							*	*	*	*	
IV-9	4.60	-----							*	*	*	*	
IV-10	4.25	-----									*	*	
II-7	3.65	-----											
II-8	3.40	-----											
I-6	3.00	-----											
I-7	2.85	-----											

* indicates $p < .05$

TABLE 7
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF
IMMEDIATE MEMORY RECALL FOR TWELVE LETTERS AT THE
SIX-SECOND EXPOSURE LEVEL

Groups	Mean	Groups											
		VI-12	VI-11	V-11	III-9	IV-9	V-10	IV-10	III-8	II-7	I-6	I-7	II-8
VI-12	4.85	-----					*	*	*	*	*	*	*
VI-11	4.45	-----					*	*	*	*	*	*	*
V-11	4.20	-----								*	*	*	*
III-9	4.10	-----								*	*	*	*
IV-9	3.95	-----								*	*	*	*
V-10	3.30	-----											*
IV-10	3.30	-----											*
III-8	3.25	-----											*
II-7	2.60	-----											
I-6	2.35	-----											
I-7	2.25	-----											
II-8	2.15	-----											

* indicates $p < .05$

TABLE 8
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF
IMMEDIATE MEMORY RECALL FOR SIX LETTERS AT THE
NINE-SECOND EXPOSURE LEVEL

Groups	Mean	Groups											
		V-10	VI-11	III-9	VI-12	V-11	IV-9	III-8	IV-10	II-7	I-6	II-8	I-7
V-10	5.45	-----								*	*	*	*
VI-11	5.40	-----								*	*	*	*
III-9	5.20	-----								*	*	*	*
VI-12	5.05	-----								*	*	*	*
V-11	5.05	-----								*	*	*	*
IV-9	5.05	-----								*	*	*	*
III-8	4.60	-----								*	*	*	*
IV-10	4.55	-----								*	*	*	*
II-7	3.80	-----											
I-6	3.25	-----											
II-8	3.20	-----											
I-7	3.15	-----											

* indicates $p < .05$

TABLE 9
NEWMAN-KEULS COMPARISON OF ORDERED MEANS OF
IMMEDIATE MEMORY RECALL FOR TWELVE LETTERS AT THE
NINE-SECOND EXPOSURE LEVEL

Groups	Mean	Groups											
		VI-12	VI-11	IV-9	III-9	V-10	V-11	III-8	IV-10	II-7	I-6	II-8	I-7
VI-12	5.35	-----				*	*	*	*	*	*	*	*
VI-11	5.15	-----					*	*	*	*	*	*	*
IV-9	4.85	-----								*	*	*	*
III-9	4.50	-----								*	*	*	*
V-10	4.15	-----								*	*	*	*
V-11	4.00	-----									*	*	*
III-8	3.80	-----									*	*	*
IV-10	3.75	-----									*	*	*
II-7	3.05	-----											
I-6	2.65	-----											
II-8	2.50	-----											
I-7	2.30	-----											

* indicates $p < .05$

distinction between the younger subjects (I-6 to II-8) and the older subjects (III-8 to VI-12) for both the six- and twelve-letter displays. For the six-letter display, all older subjects (III-8 to VI-12) have significantly greater recall than all younger subjects (I-6 to II-8). (See Table 8.) From the results in Table 9, one can see that for the twelve-letter display, with the exception of groups III-8, IV-10 and V-11, all older subjects have significantly greater recall for twelve letters than all younger subjects (I-6 to II-8).

The three-way analysis of variance used a $2 \times 3 \times 2$ design with repeated measures on two variables to examine performance on Immediate Memory tasks. The repeated measures variables were stimulus density and exposure level. Table 10 contains a summary of the analysis.

As can be seen from Table 10, the sex of the subject (variable A) was not a relevant factor in recall on Immediate Memory tasks ($p < 0.337$). The effect of varying stimulus density (variable B) was identified as a relevant factor in recall on Immediate Memory tasks ($p < 0.001$). This result indicates that the subjects recalled significantly more of the six-letter than the twelve-letter

TABLE 10
SUMMARY OF THE THREE-WAY ANALYSIS OF VARIANCE

Source	SS	DF	MS	<i>F</i>	<i>P</i>
Between Subjects	1517.000	239			
A ^a	5.8789062	1	5.8789062	0.93	0.337
Subjects Within Group	1511.1211	238	6.3492479		
Within Subjects	1560.6680	1200			
B ^b	139.37891	1	139.37891	107.95	0.001
A B	0.390625	1	0.39063	0.00	0.956
By Subjects Within Group	307.28516	238	1.29111		
C ^c	27.29297	2	13.64648	13.40	0.001
A C	0.50391	2	0.25195	0.25	0.781
Cx Subjects Within Group	484.87109	476	1.01864		
B C	21.07031	2	10.53516	8.68	0.001
A B C	2.43750	2	1.21875	1.00	0.367
B Cx Subjects Within Group	577.82422	476	1.21392		

^a A = sex
^b B = stimulus density
^c C = exposure level

displays across all exposure levels used. The effect of varying exposure times (variable C) was identified as a relevant factor in recall on Immediate Memory tasks ($p < 0.001$). This result is difficult to interpret specifically because of the apparent inconsistency among the subject groups. This inconsistency in effect is highlighted when one compares the F -ratios for stimulus density (107.95) which is a consistent factor in recall, and exposure levels (13.40) which appears to be an inconsistent factor in recall in terms of generalizing specific conclusions concerning exposure levels to all subjects. The interactions observed between sex and stimulus density (AB $p < .956$) and sex and exposure levels (AC $p < .781$) indicate that the significant effects on recall observed for stimulus density and exposure level were not related to the sex of the subject. This result is further supported by the lack of a significant interaction between sex, stimulus density, and exposure level (ABC $p < .367$).

The significant interaction observed between stimulus density and exposure level (BC $p < 0.001$) indicates a combined effect on recall. It should be noted that the interaction F -ratio (8.68) is lower than either of the main effects. Further analysis of the data may be due to the differential effects of exposure time on stimulus density over the subject groups.

Discussion and Conclusion

Since very few studies of this kind have been reported, it is very difficult to compare results with other studies. The discussion that follows clarifies the results. The major finding of increased recall as a function of age agrees with the results obtained by Blankenship (1938), Dornbush and Basow (1970), and McCarver (1972).

Iconic Memory. The results of the one-way analysis of variance indicate a significant difference between groups in the mean recall of 6 and 12 letters. The differences between groups seems to be related to an increase in age and grade based on the results of the Newman-Keuls analysis. The significant difference between I-7 and I-6 subjects suggest a maturational effect on performance at this level. However, the significant difference observed between III-8 and II-8 subjects tends to suggest an educational effect on performance. The trend observed with the recall of 6 letters was for the I-6, I-7, II-7 and II-8 subjects to form a group of the lowest means for the recall of letters. All subjects in groups III-8 to VI-12 performed significantly better on mean recall for 12 letters than did I-6 to II-8 subjects. For the 6- and 12-letter mean recall, all groups performed significantly better in mean recall than the I-6 subjects.

One of the most important findings was the trend for subjects in III-9 to VI-12 to consistently recall more of the 12-letter displays than of the 6-letter displays. This finding is emphasized by the trend for all age-grade groups III-8 and above to recall significantly more of the 12-letter displays than subjects in II-8 and below. It appears that this difference between the eight-year-old subjects in grades two and three marks the emergence of a functionally effective Iconic Memory. This interpretation is further supported by the consistent trend for the older subjects (III-9 to VI-12) to recall more of the 12-letter than of the 6-letter displays, as compared to the

younger subjects (I-6 to III-8). If, as the results reported by Teichner and Sadler (1962) and Haith (1971) suggest, the positive relationship between recall and stimulus density is a major distinguishing feature in the comparison of the recall in Iconic Memory between those subjects with a functionally developed Iconic Memory and those lacking a developed Iconic Memory, it seems reasonable to conclude that the subjects in groups III-9 to VI-12 do demonstrate a functionally developed Iconic Memory while those subjects in groups I-6 to III-8 do not.

Immediate Memory. The development of this stage of the memory process was examined by the recall for high and low stimulus densities over three exposure times.

The results of the one-way analysis of variance indicate the existence of significant differences in mean recall for both stimulus densities at the three-, six- and nine-second exposure levels. The trend noticed in Iconic Memory for the I-6 to II-8 groups to clump together with the lowest recall performance is consistent with their performance on all Immediate Memory tasks. This distinction into older (III-8 to VI-12) subjects and younger (I-6 to II-8) subjects is most significantly demonstrated for the recall of 6 letters at the nine-second exposure level. Although the I-7, II-7, and II-8 subjects demonstrated significantly greater recall than the I-6 subjects in Iconic Memory, no significant differences are found on any of the Immediate Memory tasks. This finding seems to indicate that, until a functionally effective Iconic Memory is developed, all groups are unable to effectively function on Immediate Memory tasks.

The results of the three-way analysis of variance indicate that the exposure level and stimulus density are significant factors in recall, but the sex of the subject is not. As the exposure time increased, the significant differences between the older and younger subjects increased until, at the nine-second exposure level, the recall of all the older subjects (III-8 to VI-12) was significantly greater than the recall of all the younger subjects (I-6 to II-8). This finding agrees with Belmont and Butterfield (1971) and Dornbush and Basow (1970) that the younger subjects cannot store the information for effective recall. This conclusion is emphasized by the linear relationship between exposure time and the recall of the six-letter displays demonstrated by the III-9 to VI-12 groups. The I-6 to III-8 groups do not demonstrate this consistent trend for recall to increase as exposure time increases. The interpretation given this finding is that the older subjects have developed the ability to store the information and the increases in exposure time also permits the increased use of storage and coding strategies.

The effect of exposure time on the recall for the twelve-letter displays was to provide further distinctions amongst the older subjects. As in the six-letter conditions, as exposure time increased, the number of significant differences between groups increased as well. As the exposure time increased, the differences between the older and younger subjects became more significant. This finding suggests that the storage strategies demonstrated by the III-9 to V-11 groups for the six-letter conditions are not generally effective in storing complex stimuli. The linearly related increases in recall and exposure time for the VI-11 and VI-12 groups seem to suggest that, along with their recall superiority over the majority of the groups, the grade six subjects have developed effective mnemonic strategies to deal with high density stimuli.

The lack of this trend in the other groups indicates that the effect of increasing exposure time appears to aid confusion rather than recall. The criteria presented earlier as indicating a functionally developed Immediate Memory were: (1) the linear increase in recall for the high density stimuli as exposure time increased, and (2) the higher recall of the high density as compared with the low density stimulus. These criteria lead to the interpretation of the results as indicating that the VI-11 and VI-12 subjects are in the final stages of the development of Immediate Memory.

Summary

In the present study, Iconic Memory was measured by the amount of information available for recall. The amount of information processed, or Iconic Memory capacity, was in the final stages of development in eight-year-olds in grade three, but functionally developed in nine-year-olds in grade three. Although the younger subjects (I-6 to II-8) demonstrated significant between-group differences on Iconic Memory tasks, these differences did not occur on the Immediate Memory tasks. The development of a functionally developed Iconic Memory appears essential to the development of an effective Immediate Memory process.

References

- Averbach, E., & Coriell, A. S. Short-term memory in vision. *Bell Systems Technical Journal*, 1961, 40, 309-328.
- Baddeley, A. D. *The psychology of memory*. New York: Basic Books, 1976.
- Belmont, J. M., & Butterfield, E. L. What the development of short-term memory is. *Human Development*, 1971, 14, 236-248.
- Blankenship, A. B. Memory span: A review of the literature. *Psychological Bulletin*, 1938, 35 (1), 1-25.
- Corsini, D. A. Memory: Interaction of stimulus and organismic factors. *Human Development*, 1971, 14, 227-235.
- Dornbush, R. L., & Basow, S. The relationship between auditory and visual short-term memory and reading achievement. *Child Development*, 1970, 41, 1033-1044.
- Haith, M. M. Development changes in visual information processing and short-term visual memory. *Human Development*, 1971, 14 (4), 249-261.
- James, W. *The principles of psychology*. New York: Henry Holt and Co., 1890.
- Keele, S. W. *Attention and human performance*. Pacific Palisades: Goodyear Publishing Company, 1973.
- Kumar, V. K. The structure of human memory and some educational implications. *Review of Educational Research*, 1971, 41 (5), 379-417.
- McCarver, R. B. A developmental study of the effect of organization cues on short-term memory. *Child Development*, 1972, 43, 1317-1325.
- Miller, G. A. The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, 1956, 63 (2), 81-97.
- Neisser, V. *Cognitive psychology*. New York: Appleton-Century-Crofts, 1967.
- Norman, D. A. *Memory and attention*. New York: John Wiley and Sons, Inc., 1969.
- Sperling, G. The information available in brief visual presentations. *Psychological Monographs*, 1960, 74 (11).
- Teichner, W. H., & Sadler, E. Effects of exposure time and density on visual symbol identification. *Journal of Experimental Psychology*, 1962, 63 (4), 376-380.
- Turvey, M. T. On peripheral and central processes in vision: References from an information-processing analysis of marking with patterned stimuli. *Psychological Review*, 1973, 80, 1-52.

KEITH C. SULLIVAN

Atlantic Institute of Education

Measurement of Community School Development

This study analyzed the development of community schools in the province of Alberta. The components of community schools were identified from the literature and a questionnaire was developed to measure the extent to which these components were found in the community schools of Alberta. The top ten community schools were then compared with ten randomly selected and matched comparison schools.

A relatively large percentage of schools in Alberta (7.3%) were identified as community schools. Of the seven community school components, none were developed in the community schools to the extent suggested in the literature. However, the top ten community schools were significantly different from the comparison schools on each of the community school components. Each component was more highly developed in the community schools than in the comparison schools. (Dr. Sullivan is the Coordinator of Continuing Education at the Atlantic Institute of Education.)

The purpose of this study was to identify the community schools operating in Alberta and to analyze the extent to which components of community school education have been developed in these schools. In addition, a comparison of community and non-community schools was made to determine whether or not the schools differed in the components considered to be characteristic of community school education.

Tangible evidence of a desire to develop the components of the community education or community school concept in Canada can be seen in the reports such as the Edmonton Public Schools' (1971) "The Community School: A Focus on Living"; *The Nova Scotia Royal Commission on Education, Public Services and Provincial Municipal Relations, Volume III* (Government of Nova Scotia, 1974); and The Province of Ontario's *What Happens Next Is Up To You* (The Select Committee on the Utilization of Educational Facilities, 1975). These three Canadian reports advocate the introduction and development of community schools. However, they draw on little or no evidence of the characteristics or success of community schools as documented by research.

This lack of research referencing is not entirely the fault of the report writers because little research has been completed in Canada or the United States in the area of community schools and/or community education (Decker, 1972). Seay and associates (1974) stated that, "With the exception of the 15 doctoral dissertations cited by Totten and doctoral dissertations along with some masters theses included by Olsen, most of the (American) works cited are descriptions of experiences of practitioners and observers in the field" (p. 393). No publication dealing with the community schools other than on an anecdotal, or participant frequency count level, appears to be available in Canada.

Therefore, with the increasing interest in community schools throughout Canada and the lack of research on the subject, the area appeared to be appropriate for study. The need for studies in this area was emphasized by Musella (Coutts, 1975) in his address at the 1975 Canadian Society for the Study of Education annual conference. In this address entitled "Critical Issues Facing Educational Administrators: Directions for Future Research", he listed community education as one of the nine critical issues facing educational administrators in 1975. Musella elaborated by providing the following two categories for research: first, "a need for a new model of community education which integrates that function into the total community services"; and second, "the nature of community education".¹

This study could best be described as an exploratory study. A lack of research in the area of community education and community schools made it essential to develop an instrument to assist in the identification of existing community schools and to determine the amount of development in each of the community school education components.

Method

Conceptual Framework

The conceptual framework of this study drew from the six basic components of community education as proposed by Minzey (1974), who lists the following six components as being essential to an effective community education program.

Educational program for school age children. This component of community education is already available and operating in all public schools. It is included in the basic components, so that the grade 1-12 program is seen in its proper perspective, i.e., as a vital part of community education. Too often community educators leave the regular school program out of their definition of community education. However, it is also important to remember that this "regular" school program is only a portion of the total package of community education.

The major change to be made to the regular school curriculum, in relation to community education, is to make the curriculum more community based and relevant to every day living. This could be accomplished by including work experience projects in every child's timetable; by having guest lecturers from the community speak, on a frequent and regular basis, to the children in their classrooms; and by designing textbooks and class assignments to reflect the local community.

Joint use of school and community facilities. This component of community education involved the use of the school buildings by the community members during the day, on weekends, at night, and during school holidays. In addition, this component includes the use of community facilities by the school staff and students, e.g., community swimming pool or rink.

Additional programs for school age children and youth. Included in this aspect of community education are programs designed and executed for school age children before and after school hours, on weekends and during holidays. The activities could include enrichment, remedial, and supplemental educational programs, as well as recreational, cultural, and avocational programs.

Programs for adults. The community education concept also includes programs for the adults in the community. The student body, in this instance, is perceived as all of the people who reside in the community served by the school, regardless of age. Programs similar to those described above for school age children and youth should be available for the adults. In addition, the adults should be free to participate in a regular academic day program.

Delivery and coordination of community services. "The key role of schools is catalytic and the school would not provide programs or services which are already provided or capable of being provided by other agencies" (Minzey, 1974, p. 2).

Communities usually have an abundance of services, although a lack of coordination of these services usually gives the impression that more money and manpower are needed. One of the basic goals of community education is to coordinate existing services of the community before new and expanded programs are started.

Community involvement. The final component in Minzey's community education conceptual framework is effective community involvement. The community members must be involved in important decision-making in all aspects of the community education program. This is usually accomplished by the formation of community councils composed of representatives from as many sectors of the community as possible; for example, students, senior citizens, parents, business persons, teachers, the unemployed, etc. It is important that these people be involved in important decision-making, not in trivial decisions as given to the Parent-Teacher Associations of the past.

Because much of the literature suggests that community school education cannot be pursued with great vigour or success without sufficient funds and an administrator (coordinator) spending a considerable amount of time promoting community school relations, a seventh component was introduced: "Administration: Coordinator and Finances." This component dealt with the percentage of time staff members of the school devoted to the promotion of community-school relations and the amount of financial support provided in the school budget for facilitating a school-community program.

Questionnaire

Using the above seven components as the framework for community schools, a School Community Questionnaire (SCQ) was developed to measure

the extent to which a school had developed these community school components. Questions were designed to gather information on each of the seven components. For the purpose of illustration, the questions from the section dealing with additional programs for school age children are presented below and the method of scoring is explained.

Section 3 — Additional programs for school age children. The questions in Section 3 of the SCQ were constructed to obtain data on the third dimension of community school education; i.e., additional programs for school age children.

3.1 This question is concerned with *programs for school age children* (here termed “additional” programs) which take place before and after regular school hours, on weekends and during holidays. These programs could include enrichment, remedial or supplemental educational activities, as well as vocational or religious activities. Approximately how many of these additional programs per week are under the supervision of:

- (1) regular school staff and take place on or off the school property?
programs/week.....
- (2) “non-school” staff (not paid a salary by your School Board or Committee) and, yet, take place on school property?
programs/week.....

Question 3.1 was constructed to gather data on the number of additional programs offered for school age children.

Scoring: This question was scored by dividing the total number of programs offered by both regular school staff and “non-school” staff, by the number of professional staff in the school (Question 1.6²). This gave an indication of the number of additional programs offered to the children in relation to the size of the professional staff. To facilitate further reference to this proportion, it was call X .

$$\text{Therefore, } \frac{\text{Question 3.1 (1) and 3.1 (2)}}{\text{Question 1.6}^1} = X_7$$

The hypothetical model community school would score 1 point for X₇, demonstrating that the number of additional programs offered at the school equalled the number of professional staff members at the school.

3.2 Approximately how many students participate per week in the programs identified in:

- (1) question 3.1 (1) above? *NOTE:* If a program has more than one session per week, account for the students each time they attend a session
students/week.....
- (2) question 3.1 (2) above? *NOTE:* If a program has more than one session per week, account for the students each time they attend a session
students/week.....

Question 3.2 was designed to gather information on the number of students participating in additional programs.

Scoring: The question was scored by dividing the total number of participating students by the number of daytime students attending the school (Question 1.5³). This proportion was called X₈

$$\text{Therefore, } \frac{\text{Question 3.2 (1) and 3.2 (2)}}{\text{Question 1.5}^1} = X_8$$

The hypothetical model community school would have had $X_8 = 1$, indicating that as many children participated in the additional programs as in the school's regular daytime program.

In a similar manner, each of the community school components was measured. Using the current literature's description of "good" community schools, each component was designed to have a total score of four points.⁴ Therefore, a model community school would score four points on each of the seven community school education components and obtain a total score of 28 points.

Sample and Procedure

Ninety-four Alberta schools were identified by school superintendents as following a community school mode of operation. For the purpose of this study, these schools were called community schools. The SCQ was sent by mail to the principals of the 94 community schools. Eighty-three of these SCQ's (89.2%) were completed and returned. Comparison schools were randomly selected from the Alberta schools not identified by the superintendents as community schools and, eventually, these schools were matched with the top 10 community schools (as measured by the SCQ) on variables such as school size, school grade levels and type of school community. SCQ's were given to the principals of the 10 comparison schools and all of these questionnaires were completed and returned.

Treatment of the Data

All data from the SCQ's were coded and written on computer data punching forms. Then computer cards were punched and verified by a trained keypunch operator.

The questionnaire variables were analyzed with the assistance of t-tests and *F* tests. Whenever the *F* ratio was significant, this test was followed by the Scheffé method of testing for significant differences between pairs of means. The a priori level of significance for all tests was set at .05 (two-tailed).

Results

SCQ Scores from All Community Schools

The mean data obtained from the 83 SCQ's, for each of the community school education components, are presented in Table 1. The most highly developed community school education component in Alberta community schools was Delivery and coordination of community services, with a mean score of 3.4 points. According to the SCQ scores, the rank order of the remaining community school education components, as developed in Alberta community schools, was: (2) Additional programs for school age children and youth, 2.6 points; (3) Educational program for school age children, 2.3 points; (4) Joint use of school-community facilities, 1.7 points; (5) Administration, 1.6 points; (6) Community involvement, 1.2 points; and (7) Programs for adults, 1.0 points.

TABLE 1
MEAN SCORES ON COMMUNITY SCHOOL EDUCATION COMPONENTS FOR
THE EIGHTY-THREE ALBERTA COMMUNITY SCHOOLS

Community School Education Components	Mean Score	Score for Hypothetical Model Community School
1) Educational program for school age children	2.3	4.0
2) Joint use of school and community facilities	1.7	4.0
3) Additional programs for school age children and youth	2.6	4.0
4) Programs for adults	1.0	4.0
5) Delivery and coordination of community services	3.4	4.0
6) Community involvement	1.2	4.0
7) Administration	1.6	4.0
TOTAL	13.8	28.0

The hypothetical model community school scored four points on each of the community school education dimensions and, therefore, accumulated a total score of 28.0 points. The Alberta community schools' mean total score was 13.8 points.

SCQ Scores from Community Schools and Comparison Schools

The SCQ data obtained from the top 10 community schools and 10 matched comparison (non-community) schools are presented in Table 2. The community schools' mean scores for each of the seven community school education components were all significantly higher ($p \leq .05$) than the corresponding comparison school mean scores. This would appear to indicate that the community schools, as measured by the SCQ, developed the community school education components more than did the comparison schools. The greatest differences were found in Additional programs for school age children and youth, Programs for adults, Delivery and coordination of community services, and Administration.

The rank ordering of the community school education components differ between the two types of schools. The most highly developed component of the community schools was Delivery and coordination of community services, followed by Additional programs for school age children and youth. Both of these scores were higher than the scores assigned to the hypothetical model community school. The least developed component of the community schools was Community involvement, having less than half the score of the hypothetical model community school.

None of the comparison school mean scores were as well developed as the hypothetical community school scores. The most highly developed component was Educational program for school age children, followed by Delivery and coordination of community services. The least developed component of the comparison schools was Administration.

TABLE 2
MEAN SCORES ON COMMUNITY SCHOOL EDUCATION COMPONENTS FOR
THE TOP TEN COMMUNITY SCHOOLS AND TEN MATCHED
(NON-COMMUNITY) COMPARISON SCHOOLS

Community School Education Components	Community Schools-- Mean Score	Comparison Schools -- Mean Score	<i>p</i> (two-tailed)	Significance
1) Educational program for school age children	2.96	2.19	0.01	Sig.
2) Joint use of school and community facilities	3.81	1.34	0.02	Sig.
3) Additional programs for school age children and youth	4.73	0.72	0.00	Sig.
4) Programs for adults	3.42	0.54	0.00	Sig.
5) Delivery and coordination of community services	7.38	1.92	0.00	Sig.
6) Community involvement	1.90	0.83	0.03	Sig.
7) Administration	2.80	0.50	0.00	Sig.

Discussion

Considering that, in Canada, community schools came into focus only in 1971, a relatively large percentage of schools in Alberta (7.3%) were identified by their superintendents as community schools. Of the seven components of community school education utilized in this study, none was developed in the community schools of Alberta to the level of the model community school. In fact, four of the components, Joint use of school and community facilities, Programs for adults, Community involvement, and Administration were developed to less than one-half of the level of the model community school.

This relatively large percentage of schools identified by superintendents as community schools and the low scores obtained by these schools on the components of community school education imply that superintendents' concepts of community schools are different from those stated in community school literature. The desire of superintendents to identify schools as community schools may indicate that much more emphasis should be placed on understanding the community school education concept by people at all levels, i.e., provincial Department of Education personnel, local school administrators, and university faculty.

Alberta community schools generally should place more emphasis on each of the seven community education components. However, special emphasis should be placed on promoting joint use of school and community facilities, developing adult programs, and encouraging community involvement in education decision-making. Also more community school coordinators should be hired and/or administrators encouraged to spend more time promoting school-community relations.

On a positive note for community school advocates, the top 10 community schools were significantly different from the comparison schools on every community school education component. Each component was more highly developed in the community schools than in the comparison schools. Therefore, although the community school education concept is not well understood by educators, it is practically attainable by public schools. It appears that a school staff can develop a significantly different type of school by following the community school education concept.

The SCQ's conceptual framework, drawn from the work of Minzey, seemed to be appropriate for the study of community schools. Practitioners interested in community school education should be able to use the SCQ to assist in determining the extent to which their schools have developed the components of community school education. Consequently, from the SCQ scores, it would be relatively simple to ascertain which community school education components need more attention and development.

Recommendations for Further Study

This study was restricted to the province of Alberta. Other studies might examine community schools in other provinces on the variables examined in this study. There seems to be a need for further work on the SCQ to measure the development of community school education components, particularly to determine if each of the seven components should be equally weighted and to detect any bias in the instrument for schools of various sizes.

This study is drawn from a larger study completed by the author and entitled "Community Schools: An Analysis of Organizational and Environmental Characteristics", Unpublished doctoral dissertation, Sullivan, 1976.

Notes

1. Taken from a hand-out distributed at the 1975 Canadian Society for the Study of Education Conference, Edmonton, Alberta.
2. Number of professional (certificated) staff in school.
3. Number of daytime students in school.
4. Any score above four points was reduced to four points so that a school could not score extremely high on the total score by having developed only one component extremely well (e.g., adult classes) and left the others poorly developed.

References

- Coutts, H. T. (Ed.). 1975 proceedings, annual conference, Canadian Society for the Study of Education and Cooperating Associations. Edmonton: University of Alberta, Faculty of Education, 1975 (Mimeographed).
- Decker, L. E. *Foundations of community education*. Midland, Michigan: Pendell Publishing Co., 1972.
- Edmonton Public Schools. *The community school: a focus on living*. Alberta: 1971 (Mimeographed).

- Government of Nova Scotia. *Report of the royal commission on education, public services and provincial-municipal relations, Vol. III, Education*. Halifax: Queen's Printer, 1974.
- Government of Ontario. *What happens next is up to you*. Final report of the select committee on the utilization of educational facilities. Toronto: Queen's Printer, February 1975.
- Minzey, J. Community education — Another perception. *Community Education Journal*, 1974, May/June, 3-7.
- Seay, M. & Associates. *Community education — A developing concept*. Midland, Michigan: Pendell Publishing Co., 1974.
- Sullivan, K. C. Community schools: An analysis of organizational and environmental characteristics. Unpublished doctoral dissertation, University of Alberta, 1976.

BOOK REVIEWS

RESEARCH IN EDUCATION (THIRD EDITION). *By John W. Best.* Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1977, \$14.95 (U.S.), 403 pp.

Institutions that offer graduate degrees in education must introduce students to the language and techniques of research. The task is not an easy one, largely because of the diverse backgrounds of the students, whose fields of expertise might range from history to algebra, linguistics to vocational education, or Shakespeare to statistics. Most institutions require incoming candidates to enrol in a course in research methods, for which a cluster of texts is available. One of the texts intended for this purpose is the third edition of Best's *Research in Education*.

The book consists of ten chapters covering topics that are common to most texts in the field. The usual sequence is a beginning chapter on the general nature of research, followed by others that more or less parallel researchers' efforts in developing problems and carrying them through to the final reports. As might be expected, the bulk of the content can be found in other texts such as one written by Travers (1969) or by Englehart (1972).

Although the content includes the expected topics, Chapter 3, on using reference materials, goes far beyond what is provided in other texts. After a routine endorsement and description of library facilities, such as the card catalogue and microfiche, the author includes information of particular value to apprentice researchers in education. Under such headings as "References about references" (p. 43), "The index" (p. 46), "Abstracts" (p. 57), "Encyclopedias" (p. 61), and "Instructional aids" (p. 77), literally hundreds of sources are listed. The inventory is extensive (the *Canadian Education Index* is included) but it would be impossible to name all appropriate references (the *Alberta Journal of Educational Research* is omitted). The list in its present form is of unquestionable value, but a little more organization would have been helpful. It would have assisted the reader to place the titles in alphabetical order instead of what appears to be random order. Also, the heading "Biographical references" appears twice (p. 72 and p. 74) for no apparent reason.

An outstanding feature of Best's book is its readability. The reader gets the impression that there is a crisp clarity that stems from the author's

genuine enthusiasm for his subject. There are parts of the book that read more like a novel than a text on a topic that is often described by students as deadlly dull.

The content is developed at a basic level with extensive references to concrete applications. For some readers, the approach would be considered too simplistic, in that several essential concepts are brushed over very lightly. For example, test validity is treated in little more than one page, while test reliability receives only nine lines of text. The standard error of measurement is not mentioned.

In a text intended for the purpose of introducing research procedures to prospective graduate workers, it is difficult to understand why some research studies are dealt with in such detail. For instance, nine pages are devoted to Terman's *Genetic Studies of Genius* in Chapter 3 dealing with descriptive statistics, and almost four pages are devoted to the *Eight Year Study*. It is not clear if these projects are intended to illustrate certain procedures or if they are presented as interesting studies in themselves.

The author's efforts to achieve understandability through simplicity of presentation causes a few problems. Chapter 6, the Tools of Research, represents a grouping of topics that does not seem logical. Questionnaires, opinionnaires, and interviews certainly belong in this section, but placing "qualities of a good test" (p. 188) between "projective devices" and "sociometry" does not seem reasonable. In the same chapter, Best's talent for clarity seems to have momentarily deserted him in the description of edge-punched cards.

Another problem that stems from the desire for simplicity is the occasional misleading passage. The discussion of percentile ranks makes no distinction between a percentile and a percentile rank and actually uses the term "percentile rank" when the term "percentile" is appropriate (p. 241). Also, the impression is given that T scores and stanines are computed without first normalizing the distribution.

Research in Education is, as stated on the dust jacket, "an invaluable tool for the beginning graduate worker in the field of education." This applies especially if the students initially have uncomfortable feelings about statistical procedures, which is often the case where the research project required for a master's degree is less formal than a thesis. Some shortcomings are evident, but because none of them are too severe, the book should seriously be considered as a text or major reference for an introductory course in research methods.

V. R. Nyberg
Department of Educational Psychology
The University of Alberta

References

- Engelhart, M. D. *Methods of educational research*. Chicago: Rand McNally, 1972.
Travers, R. W. *An introduction to educational research* (3rd ed.). New York: Macmillan, 1969.

CANADIAN EDUCATION: A SOCIOLOGICAL ANALYSIS. *By Wilfred B. W. Martin and Allan J. Macdonell.* Scarborough: Prentice-Hall of Canada, 1978, 354 pages.

Martin and Macdonell have provided educators with a long-awaited sociology of education textbook which has a truly Canadian emphasis. As the authors say in the preface of their book, they have focussed on the microsociological approach, on the macrosociological approach, and on social change, in their analysis of education in Canada. Functionalism, conflict, and symbolic interactionism perspectives are used to direct their presentation.

Part I of the four-part book provides the reader with information about Canadian society — its population, languages, religions, government, economy, and educational structure. A brief account of the Canadian historical background assists the reader to understand the present economic, political, ideological, and social environments in Canada in relation to the educational scene.

Part II focuses on the social organization of the school — generally a microsociological approach to the study of education. Groups and grouping in the school are discussed using sound sociological theory. Here is a book where the teacher as a part of the school social environment is not forgotten. The formal organization, the finance, and the legal dimensions of education in each of the Canadian provinces and in the territories (to a limited extent) are analysed, as are interest groups at the local, provincial, and federal levels. By including an overview of history of education in Canada, the authors provide a base for what exists today. Part II concludes with a chapter devoted to the analysis of changes in population, schools, and school systems.

In Part III, the authors move to a macrosociological approach in their analysis of education in Canada. They explore educational opportunities by surveying the financial resources, teacher qualifications, student populations, and denominational differences of school systems. What appear to be the impacts of urban and rural environments and of culture and social class on educational opportunities are summarized. Social mobility and education, and life chances of Canadians are assessed. Finally, the authors deal with education in Canada and the labour market. What has been presented is interpreted from structural functionalism and conflict perspectives.

The three views of society — functionalism, conflict, and symbolic interactionism — are used in Part IV as approaches to the study of social change and education in Canada. Demographic, economic, and national identity changes and their probable consequences for education (changes in schools, in finance, in interest groups, and in educational opportunities) are explored. In addition, the authors look briefly at education and the future.

There are three very valuable appendices in the book. The first summarizes the development of sociology of education; the second explains the three sociological approaches used in the book. The third appendix is quoted from Section 93 of the British North America Act.

The book seems truly Canadian in its source material. In the 38 pages of references, there are more than 800 sources listed, of which approximately 600 have Canadian authors, samples, and/or publishers. Statistics Canada, beginning with 1972 publications, is used extensively.

The format of the book — parts, chapters, and appendices in 302 pages —

supplies an organized presentation to the reader. Chapters have a brief introduction stating what is to come, followed by headed and subheaded sections and a concise summary. Charts, tables, and notes at the end of each chapter provide valuable information. Both name and subject indexes increase the usefulness of the book.

Generally, the authors appear to have produced the kind of book they say they have written. Students of education and of sociology and professors should find it a valuable textbook. While the authors recommend that students have a prior introductory course in sociology before using their book, and while the reviewer advises that all sociology of education students have an introductory sociology course as a prerequisite, the style of writing of Martin and Macdonell seems to make an introductory course unnecessary. Their writing appears to focus at the undergraduate student.

Except that the paperback edition tends to come apart, the reviewer finds very little to criticize about Martin and Macdonell's book. The symbolic interactionism perspective does seem to have received less attention than structural-functionalism and conflict perspectives. While Canadian history is featured in some chapters, it appears appropriate to include it in this sociological analysis of Canadian education.

Martin and Macdonell have contributed a very valuable book in the field of sociology of education. It is current, it has a historical base, it is Canadian, and it is sociological in perspective.

Helen L. Pierce
Department of Educational Foundations
The University of Alberta

WHY BE A HEADMASTER? *By J. R. Sutcliffe.* Melbourne: Melbourne University Press, 1977, \$11.80 (Australian), 170 pp.

During the last decade there has been a steadily growing interest in the subject of headmastership. Edmonds began it with *The First Headship* (Basil Blackwell, 1968); this was followed by *Headship in the 1970's* (Bryan Allen [Ed.], published by Basil Blackwell, 1968), and *Running a School* (C. H. Barry and F. Tye, published by Temple Smith, 1972). In both the United States and Canada, study of the role of the principal has become a major industry, most university graduate courses in educational administration devoting a good deal of lecture-time and publication-space to the concept and practice of principalship. It might seem then, at first glance, that Sutcliffe is simply following a well-trodden path.

Let it be said immediately that this is not the case. *Why Be a Headmaster?* is not a study of the theory of principalship, nor does it concern itself with such run of the mill questions as "the principal as curriculum coordinator," "the principal as manager," "the principal as allocator of human and material resources," etc. Instead, Mr. Sutcliffe presents us with an intensely personal account of his life, including all those many and varied experiences that went into the making of an outstanding headmaster.

But the book is no panegyric. One might add to Mr. Sutcliffe's many delightful and apposite quotations one from the great bard himself:

Speak of me as I am; nothing extenuate,
Nor set down aught in malice. (*Othello* V. II. 341-2)

Out of the triumphs and disappointments which Mr. Sutcliffe faithfully records, one may distill many of the lessons which, in university courses on educational administration, are more talked about as open-ended case-studies, rather than shewn in operation with practical outcomes. These include the vital importance of human communication at all levels; the intellectual and, no less important, emotional muscularity that any principal has to have; the need for a principal to exercise alternately authoritarian and democratic roles, at different times and in different situations.

It may be that Mr. Sutcliffe represents a type of headmaster finding no place in this increasingly egalitarian school world of ours. When I read that, in Britain, a teacher who defied his headmaster was recently awarded considerable damages by an industrial tribunal, I wonder how deeply undermined the traditional authority of the Head has become? Are the escalating cases of violence (euphemistically dubbed disruptive behaviour) in State schools derivatives of it? Mr. Sutcliffe's discipline was firm, but kindly the kind which Lord Esher's famous judgment of 1894 prescribed. Not that this is the only way. I once had the privilege of visiting Summerhill (a private school) and formed a great regard for Neill's approach. But circumstances alter cases; and one of the skills of headmastership lies in recognizing the difference.

The closing chapters of *Why Be a Headmaster?* deal with Mr. Sutcliffe's departure from schoolmastering to the stock exchange. One little quoted incident reveals the man Mr. Sutcliffe is. A client of his bought some shares by telephone and then repudiated them when the market fell. Mr. Sutcliffe took the shares into his own name and endured the financial loss.

The book is a fascinating autobiography, written in a pleasant, modest, easy style. It is beautifully printed, with one or two excellent illustrations. I would like to see a copy of this book in every school library across the world, for it offers a philosophy of life so many adolescents can profit by when starting out on life:

Desire not to live long but to live well;
How long we live not years, but actions, tell.
(Rowland Watkyns, *Flamma Sine Fumo, The Hourglass*)

E. L. Edmonds
Professor of Education
University of Prince Edward Island

BELEVING EN ERVARING (EXPERIENCE AND LIVED EXPERIENCE):
WERKBOEK FENOMENOLOGIE VOOR DE SOCIALE WETEN-
SCHAPPEN. *By Ton Beekman and Karel Mulderij.* Amsterdam: Boom
Meppel, 1978, 147 pp.

In 1960, Stephan Strasser wrote about how, during the defense of a historical dissertation, a doctoral candidate was reproached for having neglected an important source. The student's defense consisted of a simple dismissal of the objection with the astonishing remark that he was following the "phenomenological method." A phenomenologist, so he said, has to analyze only a single representative case and does not have to waste time in carefully tracing and consulting sources.

Occurrences such as this are possible only because of ignorance on the

part of the student as well as his or her dissertation advisors. Phenomenology as a form of inquiry sometimes is understood so little that it is made to pass for almost any kind of research that has a subjective orientation. Clearly, it is highly desirable that the field of social inquiry be protected from such dilletantism.

How do you provide people with an introductory but adequate understanding of phenomenology? For years, Husserl had been under the illusion that it would be a comparatively simple matter to write a popular introduction to phenomenology, recounts Spiegelberg (1970), but in reality all his attempts throughout the last ten years (attempts which resulted in the London and Paris lectures and the French *Méditations*) has been without satisfactory results. Ever since Husserl, phenomenologists have made efforts to make their ideas more readily available to the interested readers but without much avail. Possibly, *Beleving en Ervaring* (“Lived Experience and Experience”) is the first successful text which manages to present to Dutch educators the most prominent features of the phenomenological method and attitude. (An English version is currently under preparation.) In contrast with many other introductions to phenomenology, this book by Ton Beekman and Karel Mulderij requires (on the part of the reader) little or no familiarity with traditional phenomenological sources.

Beleving en Ervaring is a modest book of 147 pages, divided into four main parts. The first chapter introduces the idea of phenomenology by squarely relating it to the commonplaces of our everyday life. In the second chapter, “An Initial Acquaintance with Phenomenology and How We Worked with Students,” the authors present the systematic procedures and workshop activities that were used to introduce students, all educators, to phenomenology. The second half of the book, chapters three and four, are more discursive and explanatory than the workshop sections. They introduce the reader to a phenomenological view of “Knowledge and Reality” and to a discussion of aspects of “The Phenomenological Method.” What makes this discussion of special interest is that they are written in a phenomenological style, that is, the authors use phenomenological reflection as a way to introduce the readers to phenomenology.

Beekman and Mulderij succeed in the felicitous endeavour to clarify major phenomenological concepts such as “life world” (*Lebenswelt*) and “eidetic reduction” without the use of this technical language. In their introductory chapter the authors note that there are two approaches to phenomenology: “you can talk about it and you can do it”. They set out to involve the reader in doing it. The reader is invited to partake in a number of exercises which are aimed at developing some sensitivity and artful competence in analyzing the essential structures of selected phenomena of everyday life “waking up,” “fear of the dark,” etc. But phenomenological method is not a skill, a technique, or a set of procedures which can be mastered in a straightforward manner. Therefore, Beekman and Mulderij intersperse their reflective display of workshop activities with a series of advisory comments.

The first advice is: “Describe a personal, simple experience as much as possible in life-world language; watch out for interpretations and causalities in the description, and do not get lost in factual detail. The important point is the ‘lived’ aspect of it” (p. 28). The participants of the workgroup are asked to write out a personal experience on a topic such as “fear of the dark.” Beekman and Mulderij point out that a careful descriptive account of a personal experience is a preparatory component of phenomenological method — comparable to data collection in traditional empirical research.

The next task is to analyze this personal life-experience description for its structural elements (reduction of essences).

Exercises such as these are further experimented upon by varying the examples or by thinking through analogous experiences. This is an attempt to look at the same phenomenon using shifting perspectives which may be only slightly different from one another. Next, the field of intersubjectivity is expanded by complementing personal life-world material with new material obtained from such sources as existentialist or phenomenological literature, poetry, novels, diaries, interviews, folk wisdom, observations, and art. The attempt is to come to an understanding of a given phenomenon through exhaustive description (rather than through causal explanation).

By means of example and illustration, Beekman and Mulderij show that the central focus of phenomenological inquiry is on the structure of the life-world. The method is situation analysis. Naturally, Beekman and Mulderij do not work in a vacuum. They are the more recent proponents of a group of scholars which in the nineteen fifties became known as the Utrecht School. Important names associated with the University of Utrecht were Langeveld in pedagogy, Buytendijk in psychology, Rümke in psychiatry, and a whole array of like-minded scholars. The work of these individuals, in turn, was based on the thoughts of Husserl, Dilthey, Schleiermacher, Litt, Flitner, and others. The members of the Utrecht School wanted to experiment with new forms of psychology and pedagogy. Beekman and Mulderij tell how talented social scientists such as Langeveld and Buytendijk wrote jewels of descriptive analyses and heavy treatises about their methodology. You can admire them, Beekman says, and sometimes follow their thoughts, but seldom can you follow in their footsteps.

So it is in *Beleving en Ervaring* that Beekman and Mulderij show how situation analysis, in a phenomenological sense, is done. They identify three distinct but interrelated facets of the investigative studies of the proponents of the Utrecht School: (1) there is the gathering of life-experience material; (2) this material is investigated for its descriptive analytic forms, or ground structures; (3) recommendations and orientations to practical action are formulated. In the actual work of individuals such as Langeveld and Buytendijk these elements are artfully interwoven in masterly descriptions. For newcomers to the enterprise of phenomenology, such descriptions are virtually impossible to reconstruct. Beekman and Mulderij do not claim to make full-fledged phenomenologists out of the participants of the workgroup. But there is little doubt that they succeed in providing the students and readers of their book with a worthwhile introduction to the confounding field of phenomenological inquiry. *Beleving en Ervaring* leads the reader into acknowledging that children experience their life-world differently than their teachers and parents. Note how Beekman and Mulderij reinforce this point in their eighth advice:

As a pedagogue, gather and collect life-experience material of children. Give children the opportunity to be as "direct" as possible. In the written and oral expressing of experiences create a relaxed and communicative atmosphere. Record verbal expressions on tape and later transcribe them integrally. If you are less experienced in phenomenological analysis, use more life-experience material. (p. 55)

Merleau-Ponty once remarked that in much psychological literature we seem to reduce the child's experience to our own. Educators are often insensitive to the observation that children experience time, space, etc., in a different modality than adults. Beekman notes how the development of

investigative instruments and statistical techniques dominates educational research. Increasing amounts of time and funding is spent in sophisticated techniques. but as the processing of information and data becomes ever more advanced, it seems that the most human element is being ignored: man's subjectivity. Phenomenology may become a countervailing force against the increasingly externalized experiences, drained of all subjectivity, which dominate the pages of educational research journals, argues Beekman. In the second part of their book, Beekman and Mulderij reflectively expand on the nature and possibilities of phenomenology. A phenomenological approach, according to the authors, can contribute to a more humanized theory of schooling (p. 94). It responds to the need in research for routes of access to an understanding of classrooms, schools and learning experiences as they appear to the child and the teacher. In these speculations Beekman and Mulderij seem to be running ahead of what they are able to offer us in their introduction to phenomenology. Meanwhile we look forward to an English version of their text.

Max van Manen
Dept. of Secondary Education
The University of Alberta

Reference

Spiegelberg, H. The beginnings of phenomenology. *Journal of the British Society for Phenomenology*, 1970, 1 (1).

EDUCATION IN CANADA

The Canadian Society for the Study of Education invites you to explore issues in education through its publications.

CANADIAN JOURNAL OF EDUCATION/REVUE CANADIENNE DE L'EDUCATION

Volume 1 (1976) \$10.00 (4 issues, \$2.50 each)
Volume 2 (1977) \$10.00 (4 issues, \$3.00 each)
Volume 3 (1978) \$12.00 (4 issues, \$3.00 each)

1976 YEARBOOK: BILINGUALISM AND CANADIAN EDUCATION/ LE BILINGUISME DANS L'EDUCATION CANADIENNE

(Merrill Swain, editor) \$3.00

The third yearbook of the Society examines the issues and research on bilingual education generated by the complex interplay of language, culture, and politics in Canada. Few countries provide as rich a setting for study or as varied experience with innovation in programs.

1977 YEARBOOK: THE POLITICS OF CANADIAN EDUCATION

(Jamie Wallin, editor) \$4.00

Following as it does, the OECD report, *Reviews of National Policies for Education, Canada*, the Yearbook provides a timely analysis of politics in Canadian education. The aspects studied include: the representative character of Canadian school boards, participatory democracy at the school level, and national policies in public education. The articles range across a broad front in educational governance, exploring the issues at national, provincial, and local levels and giving a sense of what is important in Canada's uniquely designed educational system.

Discounts: 40% on 5 copies or more.

**Canadian Society for the Study of Education/Société
canadienne pour l'étude de l'éducation**

Faculty of Education
University of Alberta
Edmonton, Alberta T6G 2G5

PREPARATION OF MANUSCRIPTS

1. All manuscripts must be typewritten, double spaced, and submitted in duplicate. An abstract of approximately 100 words in length, typed on a separate page, should be provided.
2. Tables must be numbered in Arabic numerals with the word 'Table' centered and in capital letters, e.g., TABLE 4. The heading of the table is to be centered below and typed in capitals. The format of tables should conform to the specifications in the APA Publications Manual.
3. Graphs and charts should be used only if essential. They must be carefully prepared on separate sheets in India ink, ready for reproduction. Graphs must be properly labelled using Arabic numerals, e.g., Figure 3.
4. Each table or figure should be presented on a separate page. The position of tables and graphs should be clearly indicated within the text by inserting at the relevant point the phrase (Insert Table 2 here).
5. References should appear in parentheses following the reference citing the author's name (unless the name appears in the text), the year of publication, and page number if appropriate. For direct quotations, the reference should be cited and the page number given in brackets before the final punctuation of the quotation. The references should be listed alphabetically by author's last names at the end of the manuscript under the heading, *References*.
6. Explanatory notes, numbered consecutively and identified in the text with a superscript, may be included under the heading of *Notes*. They should be double spaced and placed at the end of the manuscript immediately preceding the *References*. The citing of references and quotations in the *Notes* should conform to the procedures outlined in No. 5 above.
7. Spelling shall conform to the *Oxford English Dictionary*, except in the case of direct quotations which must conform to the original. Editorial alterations will be made if necessary.
8. In matters of style, the APA Publications Manual is considered definitive.

